THE

ONTARIO WATER RESOURCES

COMMISSION

INDUSTRIAL WASTES SURVEY

of the

CITY OF BELLEVILLE

1967

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REPORT ON

AN INDUSTRIAL WASTES SURVEY

of

THE CITY OF BELLEVILLE

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by

Division of Industrial Wastes

ONTARIO WATER RESOURCES COMMISSION

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INTRODUCTION

A survey of the industrial wastewaters within the City of Belleville was conducted by the Division of Industrial Wastes from April to July, 1967.

The purpose of the survey was to confirm or revise the information available on these wastes. The information was required to ensure that the current industrial wastes being discharged to the municipal sewerage system would not result in operating problems in the secondary sewage treatment facilities which have been proposed for the municipality. The survey was also intended to ensure that the capacity of the proposed facilities would be adequate for the expected industrial wastes loading.

The information obtained from the survey is summarized in Part I of the report and details of the surveys of the industries are included in Part II. An explanation of the terms used to describe waste characteristics is given in Appendix A.

SUMMARY

The present municipal sewage treatment plant contains only primary treatment facilities and is now overloaded. It has been proposed that this plant be expanded by increasing the capacity of present facilities and by adding an activated sludge treatment process.

Except for the Union Carbide Canada Limited plant, essentially all plants in the municipality which have significant industrial wastewater discharges receive their water supply from the municipal water system and discharge their wastewaters to the municipal sanitary sewerage system.

These plants represent 21% of the load on the municipal water supply system. They also account for 10% of the BOD_5 load (i.e., organic waste load) and about 6% of the hydraulic load on the municipal sanitary sewerage system.

It has been proposed recently that certain industrial wastes from the Union Carbide Canada Limited plant be diverted to the municipal sanitary sewers. The diversion to the sanitary sewers of these wastes and others now being discharged to storm sewers and natural water courses by a number of small miscellaneous industrial sources would result in the above waste and hydraulic loading percentages being increased to 14% and 10% respectively.

Most of the industrial BOD_5 load now being discharged to the municipal sanitary sewers represents organic wastes from plants engaged in the processing of food or other agricultural products which will be readily treated in the proposed activated sludge process. However, the industrial waste load includes heavy metals from a number of metal finishing operations which could adversely affect this process if sufficient quantities reach the proposed expanded plant. At present, the quantity of this type of waste appears to be within safe limits and careful operations by the companies concerned should avoid problems from this source.

The industrial wastes which Union Carbide Canada Limited is proposing to divert to the municipal sanitary sewers contain high concentrations of phenolic materials. This proposal arose recently, after the field work for this survey was completed. Consequently, there is insufficient accurate information concerning the quantity of phenolic materials in these wastes to accurately assess their possible effect on

the proposed expanded plant. A special survey of these wastes was carried out recently and a separate report will be issued when the results of this survey are available.

Phenolic wastes will neither significantly affect or be affected by the processes in the present sewage treatment plant. The activated sludge process proposed for the expanded sewage treatment plant would likely be capable of treating these wastes but the degree of treatment which might be achieved cannot be accurately forecast at present. The possibility of sufficient phenol surviving the treatment to cause an undesirable concentration of phenols in the treatment plant effluent must be considered.

CONCLUSIONS AND RECOMMENDATIONS

With the exception of the wastes from the metal finishing industry, present industrial wastes discharged to the municipal sanitary sewers will not adversely affect the operation of the proposed expanded sewage treatment plant. The concentration and loading of metals which were found in the wastes from the metal finishing industry during the survey will not inhibit the efficiency of the activated sludge process in the proposed expanded sewage treatment plant. However, these wastes can be a serious potential problem if their discharge is not adequately controlled. Accidental discharges of the metal plating solutions from which these wastes arise or excessive concentrations of these wastes in normal discharges can kill the organisms which provide the treatment in the activated sludge process.

The proposal to discharge industrial wastes containing high concentrations and loadings of phenolic materials from the Union Carbide Canada Limited plant to the municipal sanitary sewers requires further evaluation before the wastes are permanently accepted in the sewer system.

On the basis of the above conclusions, it is recommended that:

1. Companies engaged in metal finishing operations:
   (a) Review equipment and procedures to ensure that the concentration of metals in normal wastewaters are minimized and that metal plating solutions, which contain high concentrations of metals, cannot be accidentally discharged to the sewers and
   (b) Ensure that all personnel involved in these operations are aware of the potential effect of these wastes on the municipal sewerage system and of the measures required to avoid their discharge.
2. An agreement under the municipal by-law to accept industrial wastes from the Union Carbide Canada Limited plant should only be approved on a temporary basis until the effect of these wastes on the proposed expanded sewage treatment plant and its effluent can be established.

A number of present industrial wastes discharges to the sanitary sewers were found which did not conform to the municipal sewer use by-law. Most of these contributed relatively minor loadings to the sewerage system. Although the proposed expanded sewage treatment plant will readily accommodate these wastewaters, it is suggested that the municipality may wish to

discuss the findings with the companies concerned to determine if the waste concentrations can be reduced, if uncontaminated cooling water can be diverted from the system or if special agreements under the by-law are required.

A table summarizing the suggestions and recommendations made concerning the industrial wastewaters from individual companies is included in Appendix F.

PART I

NOTE: In this part of the report water usage, waste flows and waste loadings have been expressed in terms of millions of gallons per calendar day (MGD) and pounds per calendar day, respectively, in order to be consistent with normal municipal and design report data.

In Part II of the report, these parameters are expressed in terms of millions of gallons and pounds per operating day of the company concerned so that they may be more easily interpreted by these companies.

CONDUCT OF THE SURVEY

During the first stage of the survey all industrial establishments in the community were investigated to segregate them into dry or wet categories. A dry industry was considered to be an industry with either negligible liquid wastes or with acceptable means for the disposal of these wastes other than discharge to a municipal sanitary sewer. A wet industry was defined as an industry which:

(a) Discharged industrial wastes to a municipal sanitary sewer, or

(b) Discharged unacceptable wastes of any kind to storm sewers, drainage ditches or natural watercourses which might ultimately be diverted to the municipal sanitary sewer system.

The category into which each of the investigated industries falls is shown in the tables in Appendix B and Appendix C.

During the second stage of the survey, each of the wet industries was visited to determine if the processes operated resulted in a significant waste loading. At each industry where the waste load was considered to be significant, a waste sampling survey was conducted over an appropriate operating period - usually eight hours. All waste samples collected during these surveys were returned to the Ontario Water Resources Commission laboratories in Toronto for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition.

Information concerning the local industries and the details of their operations was obtained during visits to them in both stages of the survey. Much useful information concerning these industries and their water consumption was received from:

Mr. W. Purcell, P. Eng. - City Engineer, City of Belleville.

Mr. E. Kneisel - former Commissioner, Belleville Industrial Commission.

Mr. E. L. Burnham, P. Eng. - General Manager and Secretary, The Belleville Utilities Commission.

Mr. D. A. Little - Chief Operator, Belleville Sewage Treatment Plant.

The assistance provided by these gentlemen and the personnel of the industries surveyed is gratefully acknowledged.

The survey field work was conducted by Messrs. I. Ramsay, J. P. Bakker and G. I. Macey of the Division of Industrial Wastes, Ontario Water Resources Commission.

MUNICIPAL SANITARY SEWERAGE SYSTEM

The municipal sanitary sewerage system includes a sewage treatment plant with a submerged outfall in the Bay of Quinte, two pumping stations and an associated sewer system. The plant contains primary treatment facilities with sludge digestion and has a design capacity of 3.0 MGD. The plant effluent is chlorinated during the warm weather period each year.

Sewage from the area of the city west of the Moira River is collected in a 30-inch sewer which passes under the river to a pumping station on the east bank at Dundas and Front Streets. Sewage from the older section of the city east of the river and west of Albert Street, and a section near the Canadian National Railways yard is also fed to this pumping station. All sewage collected from the balance of the city is directed through a 21-inch trunk sewer and a 33-inch trunk sewer to a second pumping station located at the sewage treatment plant.

Arrangements are being made for expansion of the plant and the addition of secondary sewage treatment by the activated sludge process. Primary treatment design capacity of 8.0 MGD and secondary treatment design capacity of 6.0 MGD is being planned.

In the consulting engineers' report* on the proposed expanded plant, the design capacity recommended was based on the following data which the consultants had estimated:

Estimated Annual Average Sewage Data

			1965	1986
Population			31,000	51,750
Average Flow	-	MGD	6.0	8.0
BOD_5 (20 deg.C)	-	lbs./day	6,320	10,400
Suspended Solids	-	lbs./day	8,600	13,800

* City of Belleville Water Pollution Control Plant Design Report SP-66-4, August, 1966 by Gore & Storrie Limited, Consulting Engineers.

The secondary treatment facilities proposed by the consultants, while designed on the basis of a nominal capacity of 6.0 MGD, will have the capability of handling up to twice the average design flow and future major additions or expansion to meet the forecast 1986 average flow of 8.0 MGD may not be required.

INDUSTRIAL WATER USAGE AND WASTE FLOWS

All industries in the municipality except Union Carbide Canada Limited obtain their water from the municipal water system. Union Carbide Canada Limited has its own water supply with an intake in the Bay of Quinte.

During 1967, the average pumpage to the municipal water system was 4.6 MGD. Approximately 21% of this water (0.6 MGD) was delivered to the industries classified as wet in this report (excluding Union Carbide Canada Limited). The average water delivered to these wet industries in 1967 was:

INDUSTRIAL WATER USAGE

Industry	Average Water Usage - MGD
Metal Finishing Industry (5 establishments)	0.22*
Milk Products Industry (4 establishments)	0.05
Soft Drink Industry (4 establishments)	0.03
Canadian National Railways	0.11
American Optical Company (Canada) Limited	0.08
Mead Johnson of Canada Limited	0.08
W. T. Hawkins Limited	0.03
Others	0.02
	0.62

* Plants included in this category have water-using operations other than metal finishing. Water usage for metal finishing operations alone is estimated to average about 0.08 MGD.

In most of these industries, very little water is actually consumed or incorporated in the products made. Most of the water delivered to the industries is discharged to sanitary or storm sewers, drainage ditches or natural watercourses as uncontaminated water after use for cooling purposes or as wastewaters containing sanitary and/or industrial wastes.

A rough estimate of average waste flows in 1967 from these industries is as follows:

INDUSTRIAL WASTE FLOWS

	Average Waste Flow - MGD
A. Water Originating from Municipal Supply	
To Municipal Sanitary Sewer	0.34
To Municipal Storm Sewer	0.06
To Ditches and Moira River	0.19
Sub-Total	0.59
B. Water Originating from Private Supply*	
To Bay of Quinte	2.60
Total	3.19

* Union Carbide Canada Limited

The wastewaters discharged to the Bay of Quinte from the Union Carbide Canada Limited plant consist of about 0.03 MGD containing sanitary and industrial chemical wastes which are treated in a septic tank and lagoons before discharge, and 2.57 MGD of relatively uncontaminated cooling water. The company is investigating the feasibility of discharging the sanitary and industrial chemical wastes to the municipal sanitary sewer system.

Further details of the industrial waste flows are given in Appendix C and Part II. It should be noted that water usage and waste flows in Appendix C and in Part II are expressed in terms of operating days (e.g., normally 5 day/week operation) in comparison with the average calendar day basis used above.

INDUSTRIAL WASTE LOADINGS

The average daily loadings of wastewaters in the municipality are summarized as follows:

WASTE LOADINGS

	Discharged to Municipal Sanitary Sewers			Discharged to Other Points	
	Non-Industrial	Industrial	Total	Union Carbide Wastes	Other Industrial Wastes
Avg. Waste Flow - MGD	5.66	0.34	6.0	2.60*	0.25
Avg. BOD_5 - lb./day	5,685	635	6,320	185	130
Avg. Suspended Solids - lb./day	7,025	1,575	8,600	50	130

* Approximately 2.57 MGD is uncontaminated cooling water. The BOD_5 and suspended solids loadings are essentially confined to separate waste flows totalling 0.03 MGD.

Major sources of the industrial wastes BOD_5 and suspended solids loadings are:

SOURCES OF INDUSTRIAL WASTES LOADINGS
(lb. per day)

	Discharged to Sanitary Sewers		Discharged to Other Points		Total	
	BOD_5	Susp.Sol.	BOD_5	Susp.Sol.	BOD_5	Susp.Sol.
American Optical	50	1,050	-	-	50	1,050
Milk Products Industry	170	115	30	95	200	210
W.T. Hawkins Limited	195	120	-	-	195	120
Union Carbide	-	-	185	50	185	50
Soft Drink Industry	25	10	80	5	105	15
Northern Electric	35*	230*	-	25	35	255
Others	160	50	20	5	180	55
	635	1,575	315	180	950	1,755

* Includes some sanitary wastes

The metal finishing industry discharges a significant waste loading of cyanide and metals to the municipal sewer systems. These loadings are estimated as follows:

METAL FINISHING INDUSTRY WASTE LOADINGS
(lb. per day)

Cyanide, as HCN	6.0
Copper, as Cu	4.5
Nickel, as Ni	1.9
Chromium, as Cr	1.6
Zinc, as Zn	0.9
Cadmium, as Cd	0.2
Tin, as Sn	0.1
Total Heavy Metals	9.2

Further details of the industrial waste loadings are given in Appendix C and Part II. It should be noted that waste loadings in this Appendix and in Part II are expressed in terms of operating days (e.g., normally 5 days/week operation) in comparison with the average calendar day basis used above.

LIMITATIONS ON INDUSTRIAL WASTE DISCHARGES

The City of Belleville recently adopted a by-law to control the use of municipal sewers. A copy of the by-law is shown in Appendix E. The by-law stipulates in detail the conditions under which wastes will be accepted in the municipal sanitary sewers. The by-law also provides for the control of wastes discharged to storm sewers or other drainage works which, in turn, discharge to watercourses.

The Ontario Water Resources Commission has a responsibility for wastewaters which are discharged directly or indirectly to natural water-

courses. To fulfill this responsibility, the Commission has adopted objectives which limit such discharges. The limits included in the municipal by-law are consistent with those adopted by the Commission.

The municipal by-law includes specific limits on the acceptable concentrations of most of the usually encountered types of wastes. The by-law also includes provisions for exceptions to these limits by special agreement with the municipality. These exceptions, for example, might include wastes which are highly concentrated but are readily treated in the sewage treatment plant and are of insufficient volume to significantly affect the sewerage system.

DISCUSSION OF FINDINGS

The survey did not find previously unidentified sources of industrial wastes, nor were the characteristics and quantities of the wastes substantially different from estimates based on earlier surveys. The concentration of wastes in a number of industrial discharges exceed the limits set in the municipal sewer use by-law. However, in most cases, the volume of the wastewaters concerned is relatively low and the waste loading in terms of pounds of waste per day is correspondingly small. With a few minor exceptions, these wastes have not adversely affected the operation of the present sewerage system and are not expected to adversely affect the operation of the proposed expanded sewage treatment plant. While some of the industries responsible for these highly concentrated wastes may be able to reduce the concentrations by in-plant measures, the effect of such measures would not have a major effect on the waste loading to the sewage treatment plant.

The capacity of a municipal sewage treatment plant to adequately treat sewage is usually specified in terms of the average daily BOD_5 and suspended solids loadings which can be processed while achieving a desired quality of plant effluent. The present industrial wastes being discharged to the municipal sanitary sewers represent about 10% and 18% respectively, of the current total average daily BOD_5 and suspended solids loadings to the sewage treatment plant. Some additional industrial wastes in the municipality which are now being discharged to storm sewers and natural watercourses would increase these percentages to 14% and 20% respectively, if they were diverted to the municipal sanitary sewage system.

The actual loadings are compared with estimates* of the average daily loadings for the present sewage treatment plant (STP) and the design capacity of the proposed expanded plant as follows:

* Source: City of Belleville Water Pollution Control Plant Design Report SP-66-4, August 1966, Gore and Storrie Limited, Consulting Engineers.

	Average Daily Loading - lb./day	
	BOD_5	Suspended Solids
Total Sewage		
Present Loading to STP (1965)	6,320*	8,600*
Forecast Loading to Expanded STP (1986)	10,400*	13,800*
Industrial Wastes in Total Sewage		
Present Discharge to STP	635	1,575
Potential Future Diversions to STP of Wastes from Present Industries now discharged to Storm Sewers, etc.	315	180

* Source: City of Belleville Water Pollution Control Plant Design Report SP-66-4, August 1966, Gore and Storrie Limited, Consulting Engineers.

Present Industrial Wastes Discharges to the Sanitary Sewers

Over 75% of the BOD_5 loading in the industrial wastes now being discharged to the municipal sanitary sewers arises from organic industrial wastes which are readily treated by biological processes such as the activated sludge process proposed for the expanded sewage treatment plant. These wastes are from plants engaged in the processing of food and agricultural products such as milk products, potatoes, soya bean derivatives and cereals. The balance of the present industrial BOD_5 loading

arises from sanitary wastes included in some of the industrial waste effluents and from a small volume of dyeing wastes. The dyeing wastes may be difficult to treat in the proposed activated sludge process but because of their relatively small quantity, it is not expected that they will significantly affect the operation of the expanded sewage treatment plant or the quality of its effluent.

Approximately two-thirds of the present industrial suspended solids loading to the sanitary sewers arises from one plant's wastes. These particular solids are essentially inert materials which will not be affected by, and will not significantly affect an activated sludge process. Apart from the need to remove them from the system, these solids will not adversely affect the operation of the present or proposed sewage treatment facilities.

The industrial wastes loading to the present plant includes a variety of heavy metals from a number of metal finishing operations in the municipality. When present in solution in relatively low concentrations, heavy metals such as copper, nickel, chromium and zinc are toxic to the organisms which decompose or stabilize wastes in the activated sludge process. The concentration of individual metals and the total concentration of all these metals in the total sewage treatment plant influent are well within the normally accepted maximum limits for this type of waste because of the dilution available in the sewer system. However, there will be a continuing need for the companies concerned to minimize these wastes in their normal waste flows and to ensure that accidental discharges of large quantities of the wastes are prevented.

These metal finishing operations also result in the discharge of cyanide wastes to the municipal sanitary sewers. Cyanide wastes, even in concentrations of a few parts per million, will liberate highly toxic hydrogen cyanide gas under acid conditions. Since normal sanitary sewage is alkaline, the acid conditions necessary to release the hydrogen cyanide do not normally exist in municipal sanitary sewers. However, acid conditions can result from the discharge of acidic industrial wastes to these sewers. To avoid this potential hazard, the limit for cyanide in the sewer use by-law has been set at a maximum of 3 parts per million.

The concentrations of cyanide in the wastes from the plants having metal finishing departments are well within the 3 parts per million limit with one exception. At one of the plants, a particular metal treating operation results in wastes containing cyanide concentrations in excess of this limit. There is no known discharge to the sewer receiving this waste which would cause the acid conditions necessary to create hazardous situation. However, a potential hazard to personnel working on the sanitary sewers in the vicinity of the plant concerned will exist until the cyanide concentration is reduced.

The total cyanide loading to the sewerage system from these plants results in a concentration of cyanide in the sewage treatment plant influent of less than 0.3 parts per million. The biological processes in the proposed expanded plant will eliminate the cyanide or reduce its concentration to an insignificant level.

Potential Additional Waste Loads to the Municipal Sanitary Sewerage System from Present Industries

The industrial wastes from a number of plants in the municipality are now discharged to storm sewers or natural watercourses. These wastes may be diverted to the municipal sanitary sewers in the future. The table on page 17 indicates that these wastes represent BOD_5 and suspended solids loadings of 315 lbs./day and 180 lbs./day respectively. About 60% of this potential increase in BOD_5 loading to the sewage treatment plant would be from the Union Carbide Canada Limit plant. Diversion of a portion of this company's wastewaters to the municipal sanitary sewers is being considered at present. Essentially all of the balance of the potential loading increase is from soft drink and milk plants now discharging small quantities of wastes to storm sewers or natural watercourses.

The wastes from the soft drink and milk plants are relatively small in quantity and are of a type which would be readily treated in the proposed expanded sewage treatment plant. However, the industrial wastes from the Union Carbide Canada Limited plant may present some problems because of their high concentrations of phenolic and other organic materials.

The possibility of these Union Carbide wastes being diverted to the municipal sanitary sewers arose recently and insufficient accurate information is available concerning their quantity and strength to arrive at definite conclusions. A survey of the plant was carried out recently and a special separate report on these wastes will be issued when the analysis of the samples collected have been completed and the results studied. In the meantime, the possible adverse effects of these wastes

should be considered before their permanent diversion to the sanitary sewers is agreed upon.

Phenolic wastes can be treated in an activated sludge process such as is planned for the proposed expanded sewage treatment plant if they are continuously present in the treatment plant influent in reasonably uniform concentration. Under these conditions, the biological organisms in the activated sludge process will become acclimatized to the phenols and may remove up to 90 - 95 percent of the phenolic waste loading. However, if the phenol waste discharge to the sanitary sewers is intermittent and in highly concentrated slugs, the organisms will not become acclimatized and essentially all of the phenolic loading to the sewage treatment plant will be discharged, untreated, in the plant effluent.

Because of the lack of accurate information concerning these wastes, the degree of treatment which might be achieved in the proposed expanded sewage treatment plant cannot be accurately estimated. Consequently, the possibility that the phenolic waste loading might not be sufficiently reduced by the treatment processes and the treatment plant effluent, therefore, might contain undesirable concentrations of phenolic materials must be considered.

Uncontaminated Wastewaters

In many industries water used for cooling purposes in refrigerators, compressors, shell and tube heat exchangers, etc., is not contaminated during use. This type of wastewater is usually acceptable for discharge to storm sewers or natural watercourses. The municipal sewer use by-law

specifically excludes wastewaters of this type from the municipal sanitary sewer system except by special agreement with the municipality and subject to OWRC approval.

Some plants in the municipality are discharging such wastewaters to the municipal sanitary sewers. Investigations by the municipality and the companies concerned may result in diversion of a portion of these wastewaters from the sanitary sewers. However, it is unlikely that such diversions would have a major effect on the hydraulic loading on the present or proposed sewage treatment plant facilities since the total present industrial waste flow to the sanitary sewer system including these wastes, represents only about 5% of the average daily sewage flow.

PART II

NOTE: In this part of the report water usage, waste flows and waste loadings are expressed in terms of millions of gallons or pounds per operating day of the company concerned. These data can be converted to similar data in Part I of the report by multiplying by the ratio of operating days per week to the seven calendar days.

MILK PRODUCTS INDUSTRY

Four companies within the municipality process milk or milk products. These are:

Reid's Dairy Company Limited

Roblin Dairy Limited

Belleville Creameries Limited

Glen Roy Creamery & Frosty Lockers Limited.

Lee Grills Dairy Limited, which was bottling milk at the time of the field surveys, has since been sold to Brookside-Price's Dairy Trent-Quinte Limited. The new company has discontinued the processing of milk and obtains processed milk from its parent company in Kingston for local distribution.

Reid's Dairy Company Limited and Roblin Dairy Limited both bottle milk, buttermilk and cream. The other two companies produce butter made from cream received in cans. Glen Roy Creamery & Frosty Lockers Limited also manufactures ice cubes and rents freezer lockers.

At the Reid's Dairy Company Limited plant all processing wastewaters are discharged to a municipal storm sewer and only sanitary wastes go to the sanitary sewer. At the other companies all wastewaters are discharged to municipal sanitary sewers.

Excluding sanitary wastes, the main sources of wastewaters in these plants are spillages, floor and equipment wash-up water, can and bottle washing rinse water and uncontaminated cooling water from pasteurizer cooling and refrigeration units.

The following table includes estimates of the average waste flows and loadings from the milk products industry plants in the municipality based on the results of the field surveys:

MILK PRODUCTS INDUSTRY

WASTE FLOWS AND LOADINGS

	Discharge to Storm Sewers	Discharge to Sanitary Sewer	Total
Waste Flow - gal./day	6,300	40,700	47,000
BOD_5 - lb./day	42	210	252
Suspended Solids - lb./day	131	146	277

The waste loading from this industry will not adversely affect the operation of the present municipal sewage treatment plant or the proposed secondary sewage treatment facilities.

SOFT DRINK INDUSTRY

At the time of the field surveys, there were four soft drink companies operation plants in the municipality. These were:

Coca-Cola Limited

Carm's Beverages Limited

Moira Beverages Limited

Seven-Up Ontario Limited

Since the field surveys, the Seven-Up Ontario Limited plant has been closed down. It is understood that the plant and its equipment have been leased by Moira Beverages Limited but that operations have not yet been resumed.

The process wastes from these plants mainly consist of continuous flow rinse water from the bottle cleaning operations. Small volumes of cleaning and caustic solutions are discharged at infrequent intervals.

Two of the plants discharge their effluents directly or indirectly via municipal storm sewers to the Moira River. The concentration of wastes in the main rinse water effluents exceed the limits set in the proposed municipal sewer use by-law for discharge to storm sewers or natural watercourses. Since these wastes will not have an adverse effect on the present sewerage system and will be readily treated in the proposed secondary sewage treatment facilities, it is recommended that they be diverted to the municipal sanitary sewers.

It may be necessary to make special provision for the cleaning and caustic solutions because of their relatively high pH before they are diverted to the sanitary sewers. It may be necessary to reduce the pH of these wastes before discharge or to bleed them slowly into the main effluent so that the pH of the total plant effluent is within desirable limits if sufficient dilution is not available in the receiving sewer.

METAL FINISHING INDUSTRY

Five companies within the municipality have metal plating departments within their plants. These companies are:

Avon Jewellery Limited

International Hardware Company of Canada Limited

Morch Manufacturing Limited

Northern Electric Company Limited

Stewart-Warner Corporation of Canada Limited

At the time of this survey, industrial wastes from Avon Jewellery Limited were discharged to a septic tank-tile bed system and from Morch Manufacturing Limited to a sand seepage bed on its property. Since that time, Avon Jewellery Limited has diverted its wastes to the municipal sanitary sewer. Because of internal sewer arrangements, some of the Northern Electric Company Limited plating room wastes are discharged to a municipal storm sewer. All other industrial wastes, with these exceptions, are discharged to the municipal sanitary sewerage system.

Tables following this section on pages 29, 30 and 31 provide details of the characteristics and concentrations of wastes from the metal finishing operations and list the operations performed at particular plants. The following table which summarizes the estimated total industrial waste loadings from these plants to the municipal sanitary sewers includes the industrial wastes from Avon Jewellery Limited but excludes the portion of the Northern Electric Company Limited wastes discharged to the storm sewers:

METAL FINISHING INDUSTRY
WASTE LOADINGS
(lbs. per day)

Cyanide, as HCN	8.4
Copper, as Cu	6.3
Nickel, as Ni	2.7
Chromium, as Cr	2.3
Zinc, as Zn	1.2
Cadmium, as Cd	0.3
Tin, as Sn	0.2
Total Heavy Metals	13.0

Essentially all of these wastes enter the sewer system from 8:00 AM to 5:00 PM, 5 days/week. Dilution of these wastes in the total minimum sewage flow of 3.5 MGD results in estimated sewage treatment plant influent concentrations of less than 0.3 ppm cyanide and 0.4 ppm total heavy metals. These concentrations will not adversely affect the operation of the present or proposed expanded sewage treatment plants.

The municipal sewer use by-law stipulates that the concentration of cyanide in wastes discharges to the municipal sanitary sewers is to be below 3 ppm as HCN. The concentrations of cyanide in the effluents of the metal finishing industry plants were found to meet this restriction, except for the effluent from Stewart-Warner Corporation of Canada Limited. The cyanide concentration in this plant's effluent considerably exceeded the by-law limit. It is estimated that about 90% of the total cyanide load to the sewer system arises from this source.

Dilution with other wastes in the system will reduce the concentration of the cyanide wastes to acceptable levels but excessive concentrations may exist in the local sewers to which the Stewart-Warner Corporation of Canada Limited wastes are discharged. It is recommended that this company reduce the cyanide concentration in its wastes to within by-law limits.

The concentration of cyanide and copper in the wastes discharged to the municipal storm sewer by the Northern Electric Company Limited plant slightly exceed the by-law limits for such discharges. The dilution available in the sewer and the low concentrations concerned indicate that these wastes will not have a significant effect on the ultimate natural receiving waters. However, since these wastes are potentially harmful, plant management will have to remain vigilant to ensure that their concentrations and loadings remain within acceptable limits.

METAL FINISHING INDUSTRY WASTE CONCENTRATIONS - ppm

	Waste Flow* MGD	Cyanide as HCN	Copper as Cu	Nickel as Ni	Zinc as Zn	Cadmium as Cd	Tin as Sn	Chromium as Cr
Northern Electric								
To sanitary sewer	0.080	0.0	7.0	0.0	0.7	0.0	0.2	0.0
To storm sewer	0.092	1.0	2.0	0.0	5.0	0.1	2.0	0.1
Total	0.172	0.5	4.0	0.0	3.0	0.05	1.0	0.05
International Hardware								
To sanitary sewer	0.031	0.8	1.3	1.2	0.54	0.09	0.11	7.4
Stewart-Warner								
To sanitary sewer	0.0185	59.0	0.6	12.0	3.0	2.0	0.0	0.0
Avon Jewellery								
To sanitary sewer	0.010	3.6	2.6	6.6	0.0	0.0	0.0	0.0
Morch Manufacturing**								
To sand bed	0.003	4.0	0.0	0.0	0.0	0.0	0.0	4.0
Total to sanitary sewer	0.135	-	-	-	-	-	-	-
Total to other disposal	0.095	-	-	-	-	-	-	-

* Northern Electric flow is total wastewater from a number of plant areas. For other companies, flows are those from metal finishing departments only.

** Estimates: no samples collected.

METAL FINISHING INDUSTRY WASTE LOADINGS - LBS./DAY

	Waste Flow* MGD	Cyanide as HCN	Copper as Cu	Nickel as Ni	Zinc as Zn	Cadmium as Cd	Tin as Sn	Chromium as Cr
Northern Electric								
To sanitary sewer	0.080	0.0	5.6	0.0	0.6	0.0	0.2	0.0
To storm sewer	0.092	0.92	1.8	0.0	4.6	0.1	1.8	0.1
Total	0.172	0.92	7.4	0.0	5.2	0.1	2.0	0.1
International Hardware								
To sanitary sewer	0.031	0.24	0.40	0.37	0.17	0.03	0.03	2.3
Stewart-Warner								
To sanitary sewer	0.0185	7.9	0.1	1.6	0.40	0.3	0.0	0.0
Avon Jewellery								
To sanitary sewer	0.010	0.36	0.26	0.66	0.0	0.0	0.0	0.0
Morch Manufacturing**								
To sand bed	0.003	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Total to sanitary sewer	0.135	8.41	6.36	2.63	1.17	0.33	0.23	2.3
Total to other disposal	0.095	1.02	1.8	0.0	4.6	0.1	1.8	0.1

* Northern Electric flow is total wastewater from a number of plant areas. For other companies, flows are those from metal finishing departments only.

** Estimates: no samples collected.

TABLE

BELLEVILLE MUNICIPAL SURVEY

METAL FINISHING OPERATIONS*

OPERATIONS PERFORMED	NE	IH	SW	AJ	MM
1. Metal cleaning	X	X	X	X	X
2. Nickel plating	X	X	X	X	
3. Copper plating	X	X	X	X	
4. Cadmium plating	X	X	X		X
5. Zinc plating	X	X	X		
6. Tin plating	X	X	X		
7. Chromium plating	X	X			X
8. Chrome anodizing	X				X
9. Sulphuric acid anodizing	X				X
10. Chromate treatment	X	X	X		
11. Steel phosphatizing	X				
12. Precious metal plating				X	
13. Cyanide case hardening			X		

* All companies use at least some cyanide plating solutions

NE - Northern Electric Co. Ltd.

IH - International Hardware Co. of Canada Ltd.

SW - Stewart-Warner Corp. of Canada Ltd.

AJ - Avon Jewellery Ltd.

MM - Morch Manufacturing Ltd.

OTHER INDUSTRIES

Plants with negligible industrial wastewaters or with acceptable means for disposing of these waters other than discharge to the municipal sanitary sewers were classified as dry plants. Beyond ensuring proper classification, these plants were not surveyed. They are listed in Appendix B.

The wet plants not discussed in the industry group summaries in the preceding sections include some plants which are significant either because of high waste loadings or potential problems. These are:

1. American Optical Company Canada Limited
2. Dussek Brothers (Canada) Limited
3. W. T. Hawkins Limited
4. Lecithin Products Canada Limited
5. Tend'r Chic Limited
6. Union Carbide Canada Limited

1. American Optical Company Canada Limited

Industrial wastes from this plant arise mainly from the grinding and polishing of optical lenses with emery slurries and jeweller's rouge. The iron content of the rouge and the insoluble and particulate nature of the rouge and emery wastes result in high iron and suspended solids loadings in the effluent to the municipal sanitary sewers.

Apart from iron rust staining of parts of the municipal sewage treatment plant facilities, the wastes from this plant do not appear to have created significant problems in either the sewer system or the

treatment plant. However, the high suspended solids in these wastes must be hauled away from the treatment plant since they cannot be decomposed by the present or proposed treatment facilities. It would, therefore, be desirable to have more of this inert material removed from the company's wastes before they are discharged to the sewer.

2. Dussek Brothers (Canada) Limited

This plant discharges small quantities of wastewaters containing oily material and/or high concentrations of dissolved inorganic chemicals to the municipal sanitary sewer. Uncontaminated cooling water is also discharged to this sewer.

It is recommended that the oily material be removed from the wastewaters before they are discharged. It is suggested that the company consider providing means for slowly feeding the highly concentrated inorganic wastes to the sanitary sewer over an extended period of time to minimize any possible effect which they might have on the sewers. Further, it is suggested that the possibility of diverting the uncontaminated cooling water from the sanitary sewers be investigated.

3. W. T. Hawkins Limited

The BOD_5 waste loading from this plant is discharged to a municipal sanitary sewer and represents about 30% of the BOD_5 waste loading from all industrial sources and about 7% of the total loading from all sources in the municipality.

These wastes have not adversely affected the operations of the present sewage treatment plant and will be readily treated in the proposed expanded plants. However, because of the high waste loading from this company, it is recommended that company management review equipment and procedures to ensure that waste discharges are minimized.

4. Lecithin Products Canada Limited

and

5. Tend'r Chic Limited

These companies discharge oils or greases to municipal sanitary sewers which may cause plugging of local sewer lines. It is recommended that practices at these plants be reviewed to ensure that the discharge of this type of waste be minimized or eliminated.

6. Union Carbide Canada Limited

This company does not discharge any wastes to the municipal sewerage system at present. It is now investigating the feasibility of discharging its sanitary wastes and some of its industrial wastes to this system.

The industrial wastes being considered for discharge to the municipal sanitary sewerage system have a very high concentration of phenolic materials. The actual strength and quantity of these wastes is not yet accurately known and their actual effect on the proposed expanded sewage treatment plant cannot be determined. The possible adverse effect of these wastes on the plant or its effluent is discussed in some detail in an earlier section of the report (pages 20 and 21).

Until the effect of these wastes on the proposed expanded sewage treatment plant and the degree of treatment the plant will provide for the wastes can be demonstrated, it is recommended that these wastes be accepted into the municipal sewerage system on a temporary basis only.

BELLEVILLE MUNICIPAL SURVEY - 1967

AMERICAN OPTICAL COMPANY CANADA LIMITED
161 Bridge Street West

SUMMARY

This plant's main operations are concerned with the finishing of optical lenses by grinding with an emery slurry, polishing with rouge and cleaning with detergent solutions. All plant wastes are discharged to the municipal sanitary sewer.

The main wastes, iron from the rouge and suspended solids, are partially settled out in sumps before discharge.

It is recommended that these sumps be cleaned out at more frequent intervals to ensure that some settling is provided at all times before discharge to the municipal sanitary sewer.

DETAILS OF SURVEY

Description of Plant and Processes

The main operations performed in this plant are the grinding, polishing and cleaning of optical lenses. The lenses are ground with an emery slurry which is reused after passing through a classifier. After grinding, the lenses are polished with rouge, a form of ferric oxide. Finally, the polished lenses are cleaned in a detergent solution.

Diamond grinding and polishing with Zirox compound are operations also performed in the plant.

Production and Operating Data

Number of employees - 200

Operating schedule - 16 hours/day, 5 days/week

Water Usage

Source	-	municipal supply
During Survey Month	-	109,000 GPD
Average in 1967	-	113,000 GPD
Average in minimum month	-	94,000 GPD
Average in maximum month	-	156,000 GPD

Sources and Disposal of Liquid Wastes

All wastes from the plant are discharged to the municipal sanitary sewer. The significant industrial wastes from this plant are rouge (i.e., ferric oxide), which is flushed to the sewer without recovery, and undersized particles of emery which are not settled out in an emery settling basin following the classifier. The rouge and emery wastes are conveyed through separate plant sewers to separate small sumps. The discharges from the sumps are combined before discharge to the municipal sanitary sewer.

Prior to the survey, the frequency of cleaning the settled solids out of the emery settling basin had been increased from once per year to once every four months. Arrangements had also been made to have a local septic tank cleaning concern clean out the rouge and emery sewer sumps more often than the previous twice per year frequency. At the

time of the survey, the emery settling basin was relatively free of solids but the two sumps were nearly full despite reportedly having been pumped out within the month preceding the survey.

At the end of each operating shift a special clean-up within the plant results in an unusually high discharge of wastes, particularly rouge, for a short period. These periods are estimated to be from 3:15 PM to 4:15 PM and from 11:30 PM to 12:30 AM.

No wastes arise from the diamond grinding or Zirox polishing operations. The oil coolant used in diamond grinding and the Zirox compound are both recovered for reuse.

Sampling and Analysis

Composite samples from the rouge and emery sewers were collected by taking aliquots at half-hour intervals from 8:30 AM to 4:30 PM on May 2, 1967. One of the aliquots included in each composite was collected during the peak of the clean-up period. Since operations during the afternoon shift were essentially the same as during the sample period, no samples were collected during this shift.

The samples were returned to the OWRC Toronto laboratories for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. Results of the analysis are shown in the table in the following section.

WASTE FLOWS AND LOADINGS

Waste flows from the rouge and emery sumps were roughly estimated to be at the rate of 15,000 and 75,000 GPD respectively. Waste loadings are estimated as follows:

WASTE LOADINGS

Waste Characteristic	Rouge Sewer 15,000 GPD		Emery Sewer 75,000 GPD		Total	
	Conc'n ppm	Loading lb./day	Conc'n ppm	Loading lb./day	Conc'n* ppm	Loading lb./day
BOD_5	110	17	68	51	76	68
Suspended Solids	2,238	335	1,500	1,130	1,630	1,465
Total Iron, as Fe	740	111	81	61	191	172

* Calculated

It should be noted that because the sumps were filled with solids, it was not possible to ensure that some of these settled solids were not picked up in some of the aliquots collected. Therefore, the concentrations and waste loadings shown are probably somewhat higher than the actual discharges to the municipal sewer.

DISCUSSION AND CONCLUSIONS

The heavy iron and suspended solids load from this plant has contributed to minor operating difficulties at the municipal sewage treatment plant created by an unusually high solids concentration in the digested sludge. It has been suggested that high iron content of these wastes may contribute to the high removal efficiency in primary settling. The high suspended solids concentration does not appear to have caused difficulties in the sewer system.

The wastes from this plant are unlikely to adversely affect the operation of the proposed secondary sewage treatment facilities at the municipal sewage treatment plant under average operating conditions. However, it is possible that excessive concentrations of iron may occur in the treatment plant influent from time to time during periods of low flow if the company does not ensure that the wastes from its plant are minimized.

RECOMMENDATIONS

It is recommended that the frequency of cleaning out the rouge and emery sewer sumps be increased to ensure that some settling is provided at all times for wastes from these sewers.

BELLEVILLE MUNICIPAL SURVEY - 1967

AVON JEWELLERY LIMITED
295 Dundas Street East

SUMMARY

The only source of wastewaters, other than sanitary wastes, from this costume jewellery manufacturing plant is a small plating department. All waste constituents were found to be within recommended limits.

DETAILS OF SURVEY

Operating Data

Number of employees - 60

Operating schedule - 8 hours/day, 5 days/week

Water Usage

Source	-	municipal supply
During Survey Month	-	5,100 GPD
Average in 1967	-	6,300 GPD
Average in minimum month	-	5,200 GPD
Average in maximum month	-	7,900 GPD

Sources and Disposal of Liquid Wastes

Excluding sanitary wastes, the only source of liquid wastes is the plating room. Wastes from this section arise from copper flash, silver, gold, rhodium and nickel plating operations and associated acid and alkali cleaning solutions.

Still rinses are used after the precious metal baths and no wastes are sewered from these tanks. The sewered plating wastes arise from running rinses after acid and alkali cleaning, copper strike and nickel baths. Cyanide plating formulations were being used.

Plating solutions are never sewered but the small acid and alkali cleaning baths (3 gallons each) are dumped occasionally.

At the time of the survey, all wastes were being discharged to a septic tank-tile bed system but arrangements have since been made for discharge to the municipal sanitary sewer.

Sampling, Analysis and Waste Loading

A composite sample of the plating room wastes was collected on May 4, 1967 by taking aliquots at half-hour intervals during a morning of normal operations. The sample was analysed in the OWRC Toronto laboratories in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition.

The results of the analysis are:

Nickel, as Ni	-	1.7 ppm
Copper, as Cu	-	0.3 ppm
Silver, as Ag	-	0.02 ppm
Gold, as Au	-	<0.0025 ppm
Cyanide, as HCN	-	0.8 ppm

Waste loadings at these concentrations and at a plating room waste flow estimated to be about 5,000 GPD are not significant.

CONCLUSIONS

Wastes from this plant will not have any effect on the present municipal sewage treatment plant and will not adversely affect operations in the proposed secondary sewage treatment facilities.

All waste concentrations were within the limits stipulated in the proposed municipal sewer use by-law for sanitary sewer discharges.

BELLEVILLE MUNICIPAL SURVEY - 1967

BELLEVILLE CREAMERIES LIMITED
60 Station Street

SUMMARY

This creamery produces butter from cream received in cans. All wastewaters are discharged to the municipal sanitary sewer.

The wastes from this plant will not adversely affect operations at the present municipal sewage treatment plant and will be readily treatable in the proposed secondary sewage treatment facilities.

DETAILS OF SRUVEY

Plant Operations and Operating Data

Cream is received in cans. The cream is sterilized in a pasteurizer at 180°F and is subsequently cooled to 40°F. The sterilized cream is churned and the butter is separated from the buttermilk, packed and stored. The buttermilk is taken by farmers.

Number of employees - 4

Operating schedule - 8 hours/day, 6 days/week

Butter production - 800 to 2,000 lbs./day

Water Usage

Source	-	municipal supply
During survey month	-	4,000 GPD
Average in 1967	-	4,200 GPD
Average in minimum month	-	2,600 GPD
Average in maximum month	-	6,300 GPD

Sources and Disposal of Liquid Wastes

The sources of liquid wastes in this plant are spillages, floor and equipment cleaning water, can washing wastes, pasteurizer cooling water and refrigeration machine cooling water.

All liquid wastes, including uncontaminated cooling water, are discharged to a municipal sanitary sewer.

Sampling and Analysis

A composite sample of the total plant effluent was collected by taking aliquots at half-hour intervals during the processing period on May 3, 1967.

The sample was returned to the OWRC Toronto laboratories for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. The results of the analysis are shown in the table below.

WASTE CONCENTRATIONS AND LOADINGS

To calculate waste loadings, it is assumed that the total plant effluent would be approximately equivalent to the water usage. The waste loadings are estimated to be as follows:

WASTE CONCENTRATIONS AND LOADINGS

(Waste Flow = 4,000 GPD)

	Concentration ppm	Loading lbs./day
BOD_5	1,500	60
Suspended Solids	898	36

CONCLUSIONS AND RECOMMENDATIONS

Although the BOD_5 and suspended solids concentrations in the plant effluent exceed the maximum limits of 300 and 350 ppm respectively, stipulated in the municipal sewer use by-law, the relatively small quantity of these readily treatable wastes will not adversely affect the present sewage treatment plant or the proposed secondary sewage treatment facilities.

BELLEVILLE MUNICIPAL SURVEY - 1967

CANADIAN NATIONAL RAILWAYS
Rideau Area
Station Street

SUMMARY

These railway yards include office, station and operations facilities. The operations facilities include a round house, frog shop and rail saw shop.

Most sanitary wastes are discharged to a municipal sanitary sewer but those from the round house and frog shop are discharged to septic tanks which it is suspected overflow periodically to a yard sewer with an outfall on the Moira River. The discharge at this outfall also included a slight but continuous flow of oil.

An oil trap on the yard sewer appears to have eliminated the oil discharge. To eliminate the high coliform counts which have been found at the outfall to the river, railway personnel are investigating the possibility of installing "Converto" units at the suspected source of these wastes or connecting the sewer to a proposed municipal sanitary sewer on Cannifton Road.

There are no significant sources of industrial wastes except those oily wastes now eliminated.

DETAILS OF SURVEY

Plant Operations

Excluding offices and station buildings, there are three main operations buildings in the Canadian National Railways yard. These are:

1. A frog shop where railway cross-over or switch-over points are manufactured and repaired. The operations in this shop consist of welding, cutting, drilling and grinding.
2. A rail saw shop where rails are cut to size using a large circular disc saw and are drilled to provide holes for linkage bolts.
3. A round house where locomotives and railway cars receive maintenance and repairs. Also passenger cars are washed and cleaning in this building.

Water Usage

Source	-	municipal supply
Average in 1967	-	155,000 GPD (5 days/week)
Average in minimum month	-	110,000 GPD (5 days/week)
Average in maximum month	-	190,000 GPD (5 days/week)

In 1967 an effort was made by railway personnel to eliminate unnecessary water usage. This appears to have been the major cause for a reduction in the average water usage from about 260,000 GPD in 1966. In the last six months of 1967, usage averaged only 135,000 GPD. About 20% of this water is used for train servicing and most of the balance is discharged as wastewater.

Sources and Disposal of Liquid Wastes

The main wastes from this yard are sanitary wastes and industrial wastes from shop operations such as uncontaminated compressor cooling water; cooling water from metal cutting operations which is contaminated

with oils and rust particles washed from the metal; and equipment, floor and railway car wash waters.

Sanitary wastes from the office and station buildings are discharged to the municipal sanitary sewer. The sanitary wastes from the operation buildings are discharged to septic tanks some of which do not appear to have adequate tile beds and which overflow to storm sewers or ditches. None of the industrial wastewaters from this yard appear to be discharged to the municipal storm or sanitary sewers.

The only visible effluents from the yard are: (1) a yard sewer outfall which discharges to the Moira River and appears to carry wastewaters from the round house and frog shop, and (2) a ditch which drains the east end of the yard and which discharges to a ditch on Herchimer Street. This yard ditch carries the wastes from the rail saw shop.

Waste Sampling and Analysis

Samples were collected on July 7, 1967 from the outfall to the Moira River and from the yard drainage ditch as it leaves the yard at Herchimer Street. These samples were returned to the OWRC Toronto laboratories for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. Results of the analysis were as follows:

	East Yard Drainage Ditch	Moira River Sewer Outfall
BOD_5 - ppm	1.6	53
Solids - Total - ppm	928	536
- Suspended - ppm	6	10
- Dissolved - ppm	922	526
Phenols - ppb	12	8
Ether Solubles - ppm	-	51

Samples from the Moira River in the vicinity of the yard sewer outfall have been taken from time to time as part of the Commission's water quality surveillance programme. These samples have shown coliform counts of 13,000 (MF/100 ml) and higher.

DISCUSSION

The high coliform counts in the river outfall effluent suggest the presence of sanitary wastes. Railway personnel believe they have traced these wastes to inadequate septic tank facilities at the round house and frog shop. Various means for improving these facilities have been investigated but no satisfactory solution has been found. The seasonally high water table in the area appears to preclude the use of a tile bed disposal system. At present, the railway personnel are investigating the feasibility of installing "Converto" units or of connecting the receiving yard sewer to a proposed municipal sanitary sewer on Cannifton

Road. A connection to the municipal sewer system would result in an additional BOD_5 loading on the sewage treatment plant of about 25 lbs./day.

Observations of this river outfall over an extended period have shown a slight, but continuous discharge of oil. Following the sampling in July, 1967, a temporary oil trap was installed at the outfall. This trap operated satisfactorily and an improved permanent trap was built further upstream on the sewer near Cannifton Road where it could be more easily reached to pump out the collected oil. This trap appears to be operating satisfactorily.

Similar observations of the yard ditch outfall at Herchimer and Station Streets indicated that this effluent was clear and contained no oil-like material. These observations were supported by the sample analysis except for a relatively high and unexplained concentration of dissolved solids. The area drained by this ditch is included in approved plans for yard modernization. The changes in this area will include removal of some of the facilities in the area and the rebuilding of others or their inclusion in new buildings with new facilities which are to be added. Suitable waste disposal equipment will be provided in these new facilities.

BELLEVILLE MUNICIPAL SURVEY - 1967

CARM'S BEVERAGES LIMITED
48 Park Street

SUMMARY

All processing effluents from this soft drink bottling plant are discharged to a municipal storm sewer.

The pH and the BOD_5 concentration in this effluent exceed the limits set in the municipal sewer use by-law for discharges to storm sewers. With adequate pH control, these wastes will not adversely affect the operation of the present municipal sewerage system and will be readily treated in the proposed secondary sewage treatment facilities.

It is recommended, therefore, that these wastes be diverted to a municipal sanitary sewer.

DETAILS OF SURVEY

Plant Operations and Operating Data

Operations at this plant consist of soft drink bottling and bottle washing.

Number of employees	-	6 - 7
Operating schedule	-	8 hours/day, 4 days/week
Average production	-	9,000 10-oz. bottles/operating day

Water Usage

Source	-	municipal supply
During survey month	-	5,000 GPD
Average in 1967	-	6,500 GPD
Average in minimum month	-	5,000 GPD
Average in maximum month	-	13,000 GPD

Sources and Disposal of Liquid Wastes

The main source of process wastes in this plant is the running rinse of the bottle washing machine. A still rinse tank is dumped once per week and a still cleaning solution tank, about once per month. These tanks each contain about 600 gallons of solution.

All process wastes are discharged to a municipal storm sewer.

Sampling and Analysis

A composite sample of the bottle washing running rinse was collected on May 4, 1967. Grab samples of the two tanks were also taken. The samples were returned to the OWRC Toronto laboratories for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. Results of the analysis are summarized in the following sections:

WASTE CONCENTRATIONS AND LOADINGS

The waste concentrations and loadings are as follows:

	Waste Flow	BOD_5		Suspended Solids		pH
		Con'n ppm	Loading lbs/day	Con'n ppm	Loading lbs/day	
Bottle Washer Rinse	6,500 GPD	136	9	15	1	10.3
Still Rinse Tank*	600 gall.	100	0.6	38	0.2	12.2
Cleaning Solution Tank**	600 gall.	1050	6	488	3	12.6

* Once per week ** Once per month

CONCLUSIONS AND RECOMMENDATIONS

The BOD_5 concentration and pH of the wastes exceed the limits of 15 ppm and 5.5 to 9.5 respectively, set out in the municipal sewer use by-law for discharges to storm sewers. If the high pH wastes are neutralized or are discharged slowly over a period of time, the discharge of all wastes from this plant to the municipal sanitary sewer would have no significant effect on the present municipal sewerage system and will be readily treated in the proposed sewage treatment facilities. It is recommended, therefore, that:

1. The pH of the cleaning and caustic solutions should be reduced to below 9.5 before being dumped, or
2. The solution be held and bled out with the other effluents at a rate such that the pH of the combined effluent is acceptable.
3. The wastes be diverted to the municipal sanitary sewer.

BELLEVILLE MUNICIPAL SURVEY - 1967

COCA-COLA LIMITED
174 Sidney Street

SUMMARY

All processing wastes from this soft drink bottling plant are discharged to a municipal sanitary sewer. The concentration of wastes from this plant are within the limits for discharges to sanitary sewers set out in the municipal sewer use by-law with the exception of pH. The pH was found to be above the 9.5 maximum limit. It is recommended that plant management review its bottle washing operations to reduce the carry-over of caustic cleaning solutions into the effluent.

DETAILS OF SURVEY

Plant Operations and Operating Data

Two soft drink bottling machines are operated at this plant. All water used in the product is filtered and treated with coagulants before use.

The small bottling machine operates two days/week all year. The large bottling machine is operated three days/week in the winter low production period rising to 5 days/week during peak summer production.

The plant operates on a normal 8-hour day with overtime as required. The number of employees is about 32 including truck drivers and office personnel.

Water Usage

Source	-	municipal supply
During survey	-	20,000 GPD
Average in 1967	-	25,000 GPD
Average in minimum month	-	23,000 GPD
Average in maximum month	-	32,000 GPD

Sources and Disposal of Liquid Wastes

The main volume of wastes arises from the continuous flow of wash water from the bottle washing machines. A small volume of wastes arises periodically from the discharge of bottle washing compounds and water treatment filter backwash as follows:

Small bottling machine washing compound - 400 gal. once per year

Large bottling machine washing compound - 1100 gal. twice per year

Filter backwash - 250 gal. once per week

These wastes are all discharged to a municipal sanitary sewer without treatment.

Sampling and Analysis

A composite sample of the large machine bottle washing wash water was collected on May 2, 1967 throughout the period of machine operation. (The small bottling machine was not in operation.) The sample was returned to the OWRC Toronto laboratories for analysis according to the methods described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. The results are summarized in the following section.

WASTE CONCENTRATIONS AND LOADINGS

The waste concentrations in this type of operation are considered to be relatively independent of waste flow. The following waste loadings have been calculated based on an estimated waste flow of 25,000 GPD.

	Waste Concentration ppm	Waste Loading lb./day
BOD_5	121	30
Total Solids	572	143
Suspended Solids	42	11
Dissolved Solids	530	132
pH	11.1	

CONCLUSIONS AND RECOMMENDATIONS

The wastes from this plant should have no adverse effect on the present municipal sewage treatment plant and will be readily treated in the proposed secondary sewage treatment facilities.

The pH of the wastes exceeds the maximum limit of 9.5 set for discharges to sanitary sewers in the proposed municipal sewer use by-law. The excessive pH may lead to deposition of calcium compounds in the receiving sewer. It is noted that this has been a problem in the plant sewer in the past.

It is recommended that plant management review its operating procedures to minimize the caustic carryover from the bottle cleaning operation. It is also recommended that consideration be given to bleeding off the cleaning solution tanks to the sewers over an extended period of time to minimize the effect of these discharges.

BELLEVILLE MUNICIPAL SURVEY - 1967

DELORO STELLITE DIVISION
DELORO SMELTING AND REFINING COMPANY LIMITED
471 Dundas Street East

SUMMARY

This plant produces small castings of iron, cobalt, nickel and chrome alloys. Water is used for cooling and sanitary purposes. The cooling water recirculation system includes a holding pond which overflows periodically to a drainage ditch. The sanitary wastes are discharged to a company-owned septic tank-tile bed system which, in turn, discharges to a drainage ditch.

It is recommended that the sanitary wastes be diverted to the municipal sanitary sewer.

DETAILS OF SURVEY

Plant Operating and Water Usage Data

The plant operates 8 hours/day, 5 days/week and employs about 150 people. Water is obtained from the municipal supply and usage averages about 30,000 GPD.

Sampling and Analysis

Grab samples were collected from the cooling water holding pond overflow and the septic tank-tile bed system effluent on June 1, 1967. These were returned to the OWRC Toronto laboratories and were analysed according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. Results of the analysis were as follows:

Waste Concentrations - ppm

	Pond Overflow	Septic Tank System Effluent
BOD_5	6.6	32
Solids - Total	378	416
- Suspended	9	44
- Dissolved	369	372
COD	80	340
Chromium as Cr	0.2	0.02
Nickel as Ni	0.07	0.5
Iron as Fe	0.4	0.8
Cobalt as Co	0.0	0.02

CONCLUSIONS AND RECOMMENDATIONS

The presence of sanitary wastes in the septic tank system effluent is suggested by the concentration of BOD_5 in the sample collected. It is recommended that these wastes be discharged to the municipal sanitary sewerage system.

BELLEVILLE MUNICIPAL SURVEY - 1967

DUSSEK BROTHERS (CANADA) LIMITED
299 Station Street

SUMMARY

This company produces chemical additives, paint driers and insulating oils for electrical cables and has facilities for custom distillation. All processes are carried out in closed systems and most of the liquid waste from the plant is uncontaminated cooling water from the distillation column condenser. Small quantities of liquid wastes containing oily material and/or high concentrations of other waste materials are produced periodically in the manufacture of the insulating oils, additives and driers. All liquid wastes are discharged to a municipal sanitary sewer.

It is recommended that the following changes be considered:

1. Uncontaminated cooling water be diverted to a municipal storm sewer or to a drainage ditch.
2. Oily material be removed from wastewaters before discharge to the sanitary sewer.
3. The small quantities of highly concentrated wastes be fed to the sanitary sewer over an extended period of time to minimize any possible effects that they may have on the municipal sewerage system.

DETAILS OF SURVEY

Plant Operations and Operating Data

This plant manufactures chemical additives, paint driers and insulating oils for electrical cables and does custom distillation work. The chemical additives and paint driers are made in 1,000-gallon reactors using combinations of caustic soda, cobalt and manganese sulphates, calcium and lead naphthanate and naphthalene. In the production of paint driers, the reaction takes place in a reaction mixture containing a water phase.

The production of insulating oils and the custom distillation work include batch distillation, slurrying with activated clay and filtration operations.

The plant operates 8 1/2 hours per day, 5 days per week and has 10 employees.

Water Usage

Source	-	municipal supply
During survey	-	8,300 GPD
Average in 1967	-	10,500 GPD
Average in minimum month	-	5,900 GPD
Average in maximum month	-	15,500 GPD

Sources and Disposal of Liquid Wastes

The main source of the liquid wastes from this plant is the uncontaminated cooling water from the distillation column condenser. Batch type discharges of oily wastes from insulating oil production and

custom distillation occur periodically. Similar types of discharges from additive and drier production, particularly the reaction mixture water phase discharge, also occur periodically. These batch discharges are small in volume but contain high concentrations of wastes.

All liquid wastes are discharged to a municipal sanitary sewer.

Sampling and Analysis

A composite sample of the total plant effluent was collected on May 30, 1967 from 9:30 AM to 4:30 PM. Grab samples of the distillation column cooling water and of the water phase discharge from a paint drier reaction mixture were also obtained.

The samples were returned to the OWRC Toronto laboratories for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. The results of the analysis were as follows:

Waste Concentrations - ppm

	Dissolved Solids	Suspended Solids	Ether Solubles	Sulphate as SO_4	Manganese as Mn
Total plant effluent	*	*	2,038	564	-
Cooling water	200	7	-	-	-
Reaction Water Phase	459,000	2,750	178	271,000	20,000

* Presence of oil precluded reliable results

CONCLUSIONS AND RECOMMENDATIONS

The wastes from additive and drier manufacture are small in volume and occur infrequently. (Drier production about once per month results in about 400 gallons of water phase effluent.) Similarly, the oil bearing wastes represent a very small portion of the present waste flow. These wastes, however, are discharged in batches and result in very high concentrations of the particular waste materials in the immediate sewer flow. It is recommended, therefore, that the "dumping" of these wastes be discontinued. It is suggested that consideration be given to discharging the batch dumps over an extended period of time so that dilution provided in the receiving sewer will adequately reduce the waste concentrations. It is recommended that the oily materials be removed before the wastes are sewered.

It is recommended that diversion of the uncontaminated distillation column cooling water to storm drainage be considered.

BELLEVILLE MUNICIPAL SURVEY - 1967

GLEN ROY CREAMERY AND FROSTY LOCKERS LIMITED
289 Pinnacle Street

SUMMARY

This plant produces butter from cream received in cans, manufactures ice cubes and rents freezer locker space. All liquid wastes, including uncontaminated cooling water, are discharged to the municipal sanitary sewer.

The wastes from this plant will not adversely affect operations at the present municipal sewage treatment plant and will be readily treatable in the proposed secondary sewage treatment facilities.

It is recommended that the company investigate the possibility of diverting as much as possible of the uncontaminated cooling water to a municipal storm sewer.

DETAILS OF SURVEY

Plant Operations and Operating Data

The plant produces butter from cream and manufactures ice cubes. Freezer locker space is rented.

In the creamery, cream is received in cans, sterilized in a coil type pasteurizer and churned in a 2,000-lb. capacity churn. Buttermilk is collected in cans for delivery to farmers.

Ice cubes are made by freezing water in barrels suspended in a cooled brine solution. They are stored in a refrigerator prior to sale.

Number of employees - 2

Operating schedule - 8 hours/day, 5 1/2 days/week

Butter production - 25,000 to 80,000 lbs./month

Ice cube production - 90 to 1,350 tons/month

Water Usage

Source - municipal supply

During survey month - 20,700 GPD

Average in 1967 - 31,000 GPD

Average in minimum month - 13,400 GPD

Average in maximum month - 39,400 GPD

Sources and Disposal of Liquid Wastes

Excluding sanitary wastes, the main sources of organic wastes loadings from this plant arise from the creamery operations. Spillages and floor equipment and can wash waters account for most of this type of waste.

The largest portion of the waste flow is accounted for by uncontaminated cooling water from the pasteurized cream cooling and the ice cube production and storage and freezer locker refrigeration equipment.

All liquid wastes, including cooling waters are discharged to the municipal sanitary sewer.

Sampling and Analysis

A suitable sample point for the total plant effluent was not available. However, a composite sample of the creamery wastes was

collected from the creamery section floor drain on May 2, 1967. This sample was returned to the OWRC Toronto laboratories for analysis according to the procedure described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. The results of this analysis are shown in the table in the following section.

WASTE CONCENTRATIONS AND LOADINGS

No positive means of measuring waste flow was available. The estimates in the table below were based on water usage in the plant and on observations made during the survey.

	Flow GPD	BOD5		Susp. Solids	
		Conc'n ppm	Loading lb./day	Conc'n ppm	Loading lb./day
Creamery Wastes	3,800*	2,200	84	2,220	84
Cooling water - ice prod'n	6,500	-	-	-	-
- lockers	6,400	-	-	-	-
Total loading/avg. conc'n	16,700	500	84	500	84
Water content of ice made	4,000				
Water Usage	20,700				

* Includes pasteurizer cooling water

CONCLUSIONS AND RECOMMENDATIONS

The wastes from this plant will not adversely affect the present municipal sewerage system and will be readily treated in the secondary sewage treatment facilities which are proposed for the municipal treatment plant.

The estimated concentrations of the suspended solids and BOD_5 in the total plant effluent are considerably above the limits of 350 and 300 ppm respectively, which are stipulated in the municipal sewer use by-law for sanitary sewer discharges. However, it is believed that the sample of creamery wastes which was collected contained an abnormally high concentration of wastes because of the lack of a sampling point which would permit accurate sampling. Observations of the plant made during the survey indicated that waste concentrations in the plant effluent should be normal for the type of operations performed.

It is recommended that the company investigate the possibility of diverting as much as possible of the uncontaminated cooling water to the storm sewer.

BELLEVILLE MUNICIPAL SURVEY - 1967

W. T. HAWKINS LIMITED
105 Pinnacle Street

SUMMARY

This plant produces potato chips and a cheese-flavoured corn meal product called "cheezies". The manufacture of "cheezies" does not result in a liquid waste. Essentially all industrial wastes arise from the potato chip process and cooling equipment. All wastewaters are discharged to a municipal sanitary sewer.

The concentration of BOD_5 and suspended solids in the effluent from this plant considerably exceed the limits of 300 ppm and 350 ppm respectively, set in the municipal sewer use by-law.

The BOD_5 waste loading from the plant is about 450 lbs./day or equivalent to a population of about 2,500 and represents about 7% of the total BOD_5 loading to the municipal sewage treatment plant.

While wastes from this plant will not have an adverse effect on the present municipal sewerage system and will be readily treated in the proposed secondary sewage treatment facilities, it is recommended that plant management review its operating procedures to determine if the waste loading can be reduced.

DETAILS OF SURVEY

Plant Operations and Operating Data

The principle waste producing operation at this plant is the manufacture of potato chips. The chip manufacturing process consists of the following steps:

1. Peeling in a rotary drum
2. Washing in running water
3. Sorting
4. Slicing
5. Washing in running water
6. Cooking in oil
7. Salting
8. Packing

The plant is operated 5 days per week with the exception of the potato chip line which is operated only 3 days per week, 9 1/2 hours per day.

Average production is about 4,500 lbs. of chips per production day. Potato usage averages about 190,000 lbs./month or 15,000 lbs./ production day (wet weight).

Water Usage

Source	-	municipal supply
Average in 1967	-	36,000 GPD
Average in minimum month	-	28,000 GPD
Average in maximum month	-	58,000 GPD

Sources and Disposal of Liquid Wastes

The main sources of liquid wastes from this plant are the potato chip line wash waters and uncontaminated cooling water from the air conditioning system and refrigeration unit. All of the wastewater is directed to the municipal sanitary sewer system.

The wastewater from the potato chip line is screened prior to discharge and the screenings are periodically removed and disposed of on land.

Sampling and Analysis

Composite samples of the potato chip line effluent and the total plant effluent were collected from 6:45 AM to 2:30 PM on May 31, 1967. The samples were returned to the OWRC Toronto laboratories for analysis according to the methods described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. Results of the analysis are summarized in the following section.

WASTE CONCENTRATIONS AND LOADINGS

During the survey, it was estimated that essentially all of the wastes in the plant effluent originated in the potato chip line and that on the day of the survey, when 12,000 lbs. of potatoes were processed, the volume of liquid wastes from the line was 16,240 gallons. On the basis of this data and the waste analysis shown below, the waste loadings for an average production day when 15,000 lbs. of potatoes are processed was calculated to be as follows:

Potato Chip Line Waste Flow GPD	BOD_5		Suspended Solids	
	Conc'n ppm	Loading lb./day	Conc'n ppm	Loading lb./day
20,300	2,200	446	1,378	280

The total plant effluent sample which included both the potato chip wastes and uncontaminated cooling water had BOD_5 and suspended solids concentrations of 810 and 320 ppm respectively.

CONCLUSIONS AND RECOMMENDATIONS

The concentration of BOD_5 in the plant effluent considerably exceeds the limit of 300 ppm set in the municipal sewer use by-law for discharges to sanitary sewers. While the concentration of wastes and the waste loadings from this plant are about average for the type of operations involved, the wastes represent a significant loading to the municipal sewerage system. Although these wastes are unlikely to have an adverse effect on the present municipal sewerage system and will be readily treated in the proposed secondary sewage treatment facilities, they are equivalent to a population of about 2,500 people and represent about 7% of the total BOD_5 loading to the municipal sewage treatment plant.

It is recommended, therefore, that the company review its operating procedures to determine if the waste loading can be reduced.

BELLEVILLE MUNICIPAL SURVEY - 1967

INTERNATIONAL HARDWARE COMPANY OF CANADA LIMITED
180 Coleman Street

SUMMARY

This plant manufactures locks, lock sets and related metal hardware. All plant wastewaters are discharged to a municipal sanitary sewer. The main source of industrial wastes is the plant's diversified plating department.

The concentration of chromium in some plating department effluent samples exceeded the limit set out in the municipal sewer use by-law for sanitary sewer discharges. The cyanide concentration in one of these samples was equal to the limit set for this material in the by-law.

The concentration and waste loadings of these material are not sufficient to create problems in the municipal sewerage system or in the proposed secondary sewage treatment facilities. However, it is recommended that plant management review plating room procedures to ensure that the discharge of these wastes is minimized wherever possible.

DETAILS OF SURVEY

Description of Plant and Processes

The plant manufactures locks, keys, lock sets and related hardware. It includes a metal foundry and other metal working facilities, a plating department and a variety of assembly and inspection departments.

Operations performed in the plating department are summarized as follows:

Plating - bronze, brass, nickel, copper, chrome, zinc, cadmium.

Phenolic lacquer stripping.

Nitric acid/sulphuric acid bright dips.

Hydrochloric acid pickling.

Cyanide cleaning.

Alkali cleaning.

Most of the plating solutions used are cyanide solutions.

All plating baths are not used every day although all operations were represented to some extent during the survey.

Production and Operating Data

Number of employees - 315

Operating schedule - 8 hours/day, 5 days/week

Water Usage

Source	-	municipal supply
During survey month	-	53,000 GPD
Average in 1967	-	62,000 GPD
Average in minimum month	-	41,000 GPD
Average in maximum month	-	79,000 GPD

Sources and Disposal of Liquid Wastes

The source of the most significant industrial wastes from this plant is the plating department. Other sources of wastewater are sanitary

facilities, boiler blowdown and miscellaneous wastes sewered in other plant operations. A large proportion of the water delivered to this plant is first used as cooling water and then is fed to the plating department for use in the plating rinse tanks.

The plating department wastewaters are collected in a sump prior to discharge to the municipal sanitary sewer.

Water metered to the plant during the 8-hour survey period was 30,500 gallons. Rough flow measurements made of the plating department effluent during the same period indicated a waste flow of 26,000 gallons.

Sampling and Analysis

Composite samples were collected from all tanks with continuous overflows and from the total department effluent by aliquoting at 1/2 hour intervals from 8:30 AM to 4:30 PM on June 1, 1967. Grab samples were also taken from the hot still rinse tanks.

The samples were returned to the OWRC laboratories in Toronto for analysis according to the methods described in "Standard Methods for the Examination of Water and Wastewater", 12th edition.

The results of the analyses are summarized in the table in the following section and details are given in the tables on pages 78 and 79.

Waste Loadings

Basis: Waste flow during sampling period (i.e., period of operations in plating department) = 30,500 gallons.

	Concentration ppm*	Waste Loading lb./day
Cyanide, as HCN	0.80	0.24
Copper, as Cu	1.3	0.40
Chromium, as Cr	7.4	2.3
Zinc, as Zn	0.54	0.17
Tin, as Sn	0.11	0.03
Nickel, as Ni	1.2	0.37
Cadmium, as Cd	0.09	0.03

* Weighted average of three total effluent samples according to length of sampling period.

CONCLUSIONS AND RECOMMENDATIONS

With the exception of chromium, the plating waste concentrations are within the limits set out in the municipal sewer use by-law. The averaged chromium concentration only slightly exceeded the maximum limit of 5 ppm required by this by-law.

The wastes from this plant are not expected to create problems in the municipal sewerage system or in the proposed secondary sewage treatment facilities. However, to ensure a minimum of these potentially toxic wastes in the system, it is recommended that plant management

examine plating room procedures for means to minimize the discharge of plating wastes (especially chromium) wherever possible.

INTERNATIONAL HARDWARE COMPANY OF CANADA LIMITED

Sample Source	Waste Concentrations - ppm						
	Cyanide as HCN	Copper as Cu	Chromium as Cr	Zinc as Zn	Tin as Sn	Nickel as Ni	Cadmium as Cd
Cold Running Rinses							
Brass plating	0.4	1.0	-	-	0.24	-	-
Brass plating	0.0	0.06	-	-	0.0	-	-
Acid bright dip	-	10.0	-	-	0.10	-	-
Cyanide cleaner	4.6	0.55	-	-	0.52	-	-
Acid cleaner	2.0	0.33	0.04	-	0.16	-	-
Zinc, copper, copper, acid	1.2	0.61	0.03	0.0	-	-	-
Zinc, copper, cyanide, acid	0.6	0.11	0.02	0.0	-	-	-
Zinc, copper, cyanide, acid	0.0	0.02	0.02	0.2	-	-	-
Copper, zinc, cadmium, cyanide	16.6	0.70	0.0	0.8	-	-	6.8
Copper, nickel, boric acid	16.0	9.3	0.01	-	-	18.7	-
Copper, nickel, boric acid	1.6	0.61	0.03	0.0	-	2.72	-
Nickel plating	-	-	0.0	-	-	15.7	-
Chrome plating	-	-	0.06	-	-	-	-
Chrome plating	-	-	6.75	-	-	-	-

Sample Source	Waste Concentrations - ppm						
	Cyanide as HCN	Copper as Cu	Chromium as Cr	Zinc as Zn	Tin as Sn	Nickel as Ni	Cadmium as Cd
Chromic acid	-	-	5.55	0.0	0.14	-	-
Chromic acid	0.0	-	0.05	0.1	0.0	-	-
Copper, nickel, boric acid	2.8	1.59	-	5.6	0.0	12.5	-
Hot Still Rinses							
Brass plating	2.4	1.86	-	-	0.14	-	-
Paint stripper	-	-	-	-	-	-	-
Cyanide bath	4.2	-	-	1.2	0.14	-	-
Brass plating	0.0	0.28	-	0.0	0.0	-	-
Zinc, copper, cyanide, acid	0.0	10.6	-	4.8	-	-	-
Chrome plating	-	-	0.02	-	-	-	-
Chrome plating	-	-	1.38	-	-	-	-
Main Sump Effluent (Total Dept. Waste)							
Composite 8:30 AM to noon	0.0	0.16	14.6	0.4	0.14	0.40	0.0
Composite 1:00 PM to 3:30 PM	0.0	2.4	0.05	0.6	0.08	0.96	0.05
Composite 3:30 PM to 4:30 PM	5.6	2.5	0.50	0.9	0.10	3.44	0.5

BELLEVILLE MUNICIPAL SURVEY - 1967

LECITHIN PRODUCTS CANADA LIMITED
48 Dundas Street West

SUMMARY

This plant produces various grades of lecithin, a phosphorus-containing glyceride derived from soya beans, by blending dehydrated lecithin, soya bean oil and a variety of additives. Essentially all of the wastes from this plant arise from the cleaning of the drums in which the lecithin is transported and from spillages.

The wastes have extremely high concentrations of BOD_5, suspended solids and ether solubles. These wastes tend to congeal at normal sewer temperatures and have resulted in sewer line blockages.

It is suggested that consideration be given to reducing or eliminating these wastes by steaming out and collecting most of the lecithin before cleaning the drums or collecting the total washings in a holding tank or basin for subsequent removal to a suitable land disposal site.

DETAILS OF SURVEY

Plant Operations and Wastes

This plant operates 8 hours/day, 5 days/week and employs 6 people. Operations consist of the blending of dehydrated lecithin, soya bean oil and a variety of additives to produce various grades of lecithin with different analyses and physical properties.

The operations include the cleaning out of the 45-gallon drums in which the lecithin is received before reusing them for the product. Most of the wastes from this plant arise from this cleaning operation. The viscous lecithin residues in the drums are cleaned out by using a detergent solution and hot water. Some drums containing particularly viscous lecithin residues are soaked in a 200-gallon tank containing a hot detergent solution. Approximately 22 barrels are cleaned per day and each cleaning results in about 10 to 20 gallons of wastewater. Once per week the cleaning tank is discharged to the sewer.

These wastes, spillages, floor washings and sanitary wastes are all discharged to a municipal sanitary sewer.

Sampling and Analysis

A composite sample of drum washings was made up by taking a series of grab samples from each of 6 washings. A grab sample of the cleaning tank solution was obtained immediately prior to its discharge to the sewer.

The samples were returned to the OWRC Toronto laboratories for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. Results of the analysis are shown below.

WASTE CHARACTERISTICS AND LOADINGS

The wash water resulting from the emulsification of the lecithin residues with the detergent solution is characterized by very high BOD_5,

suspended solids and ether solubles concentrations as shown in the following table:

Waste Characteristics and Loadings

Drum Wash Water - 330 GPD

Drum Soaking Solution - 200 gal. once/week

	Drum Wash Water		Drum Soaking Sol.		Maximum Waste Loading lb./day
	Conc'n ppm	Loading lb./day	Conc'n ppm	Loading lb./day	
BOD_5	32,000	106	8,150	16	122
Suspended Solids	4,200	14	2,250	5	19
Ether Solubles	13,400	44	3,500	7	51

An earlier investigation at this plant indicated that the emulsified waste was difficult to break into oil-like organic and water layers to facilitate separation and was the cause of sewer blockages.

CONCLUSIONS AND RECOMMENDATIONS

The concentration of the wastes from this plant exceed the limits set in the municipal sewer use by-law for sanitary sewers, viz:

BOD_5 - 300 ppm

Suspended solids - 350 ppm

Oil, fat, grease of vegetable origin (ether solubles) - 150 ppm

These wastes also contravene a section of the by-law which excludes any quantity of matter capable of obstructing sewage flow.

The waste loading from this plant is relatively small and should cause no difficulty in the present municipal sewerage system except for possible blockages in the sewers in the vicinity of the plant. The wastes are readily degraded by biological processes and will be easily treated in the proposed municipal secondary sewage treatment facilities.

It is suggested that consideration be given to reducing or eliminating the lecithin residue wastes by steaming out and collecting most of the residues before the present cleaning operation or collecting the present washings in a holding tank or basin for subsequent removal of the solids to a suitable land disposal site.

BELLEVILLE MUNICIPAL SURVEY - 1967

MEAD JOHNSON OF CANADA LIMITED
231 Dundas Street East

SUMMARY

Pharmaceutical preparations and specialty nutritional foods are produced in this plant. The wastes are essentially organic and arise from equipment and floor washings. A large proportion of the plant wastewater is uncontaminated cooling water, most of which is discharged to a drainage ditch. The balance of the wastewater is discharged to a municipal sanitary sewer.

Because of a lack of sample points and the irregular and intermittent nature of the waste discharges, it was not possible to collect representative samples of the effluents containing the organic wastes. An inspection of the operations concerned indicated that the maximum waste loading from the plant, excluding sanitary wastes, would not likely exceed about 50 lbs./day BOD_5. This maximum waste loading would likely occur during periods of extensive wash downs such as early on Saturday mornings when the cereal production equipment is washed down and on Monday mornings when there is a general plant wash down.

The wastes from this plant will not adversely affect the present municipal sewerage system and will be readily treated in the proposed secondary sewage treatment facilities.

DETAILS OF SURVEY

Plant Operations and Operating Data

This plant has two main production sections: a pharmaceutical section where pharmaceutical products such as vitamin preparations are made by simple mixing, blending and packaging operations; and a cereal section where specialty nutritional foods such as "Pablum" are produced.

In the cereal section, cereal, milk products and water are cooked in batch kettles. The cooked cereal is dried on steam heated roller dryers and is then packaged.

It was reported that a unit for producing a condensed form of skim milk was to be installed. This unit would be operated by processing and packaging on alternate days.

The plant operates 5 days per week. The pharmaceutical section operates 8 hours/day and the cereal section 24 hours/day. The number of employees is approximately 120.

Water Usage

Source	-	municipal supply
Average in 1967	-	109,000 GPD
Average in minimum month	-	51,000 GPD
Average in maximum month	-	246,000 GPD

Sources and Disposal of Liquid Wastes

A major portion of the wastewater from this plant is uncontaminated cooling water from refrigerating and cooling units and is essentially

all discharged to a drainage ditch. The skim milk condensing facilities are expected to result in an increase in this uncontaminated cooling water discharge.

The balance of the wastewater from the plant contains wastes which are essentially organic and readily biodegradable. These wastes which arise from spillage and equipment and floor washings are discharged to a municipal sanitary sewer.

The strongest concentration of these wastes will occur in the cereal section early on Saturday morning at the end of the last shift of the week when the cereal cooking kettles and roller dryers are cleaned. On Monday morning, a further discharge of relatively concentrated wastes occurs as a result of a general plant wash down.

WASTE CONCENTRATIONS AND LOADINGS

There are no openings in the plant sewer lines which are suitable for obtaining representative samples of the plant's main waste-containing effluent. Because of this lack of suitable sampling points and the irregular and intermittent nature of the waste discharges, it was felt that observations during an inspection of operations would be a more reliable guide to actual waste concentrations and loadings than the results of a limited and possibly inconclusive sampling of the various waste sources.

CONCLUSIONS AND RECOMMENDATIONS

It was concluded from the inspection of plant operations that, while concentrations of BOD_5 in the plant effluent discharged to a sanitary sewer might periodically exceed the limit of 300 ppm set in the municipal sewer use by-law, the average daily concentration would likely be below this limit.

The wastes from this plant will not adversely affect the present municipal sewerage system and will be readily treated in the proposed secondary sewage treatment facilities.

BELLEVILLE MUNICIPAL SURVEY - 1967

MOIRA BEVERAGES LIMITED
291 Coleman Street

SUMMARY

All processing wastes from this soft drink bottling plant are discharged directly to the Moira River. The concentration of BOD_5 in these wastes exceed OWRC objectives for discharges to natural watercourses and the limit set in the municipal sewer use by-law. These wastes will not adversely affect the operations of the present or proposed sewage treatment facilities. Therefore, it is recommended that they be diverted to the municipal sanitary sewer system.

DETAILS OF SURVEY

Plant Operations and Operating Data

Operations at this plant consist of soft drink bottling and bottle washing.

Number of employees - 12 to 23

Operating schedule - 8 hours/day, 3 to 5 days/week

Water Usage

Source	-	municipal supply
During survey month	-	13,000 GPD
Average in 1967	-	19,000 GPD
Average in minimum month	-	13,000 GPD
Average in maximum month	-	30,000 GPD

Sources and Disposal of Liquid Wastes

The main source of process wastes in this plant is the bottle washing machine wash water effluent which is continuously discharged while the machine is in operation. A still water rinse tank and a cleaning solution tank, each containing about 132 gallons, are dumped once each operating day. The 2,500-gallon bottle washer caustic solution tank is dumped about twice per year. All process wastes are discharged directly to the Moira River.

Sampling and Analysis

A composite sample of the bottle washing effluent was collected from 9:00 AM to 3:00 PM on May 3, 1967. Grab samples were taken at the end of the operating day from the still water rinse, cleaning solution and bottle washer caustic solution tanks. It was noted that the caustic solution tank was to be dumped within a few days.

The samples were returned to the OWRC Toronto laboratories for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. Results of the analysis are summarized in the following sections.

WASTE CONCENTRATIONS AND LOADINGS

The waste concentrations and the waste loadings calculated from them are as follows:

	Waste Flow GPD	BOD_5		Suspended Solids	
		Conc'n ppm	Loading lb./day	Conc'n ppm	Loading lb./day
Bottle Washer Overflow	13,000	1,150	142	85	11
Rinse Water Tank	132	6.9	-	21	-
Cleaning Solution Tank	132	83	-	80	-
Caustic Solution (once every 6 months)	2,500	1,975	49	258	6

CONCLUSIONS AND RECOMMENDATIONS

The concentration of wastes in the bottle washer effluent and the cleaning solution and caustic solution tanks exceed OWRC objectives for discharge to natural watercourses as shown below. They also exceed the limits set in the municipal sewer use by-law for discharges to sewers leading directly to natural watercourses.

	pH	BOD_5 ppm	Susp. Solids ppm
OWRC Objective	5.5-10.6	15	15
Bottle Washer Effluent	10.2	1,150	85
Cleaning Solution Tank	12.2	83	80
Caustic Solution Tank	13.2	1,975	258

Providing the high pH of the cleaning and caustic solutions is reduced to acceptable levels, these wastes will not have an adverse effect on the present municipal sewerage system and will be readily treated in the proposed sewage treatment facilities. It is recommended, therefore, that:

1. The pH of the cleaning and caustic solutions should be reduced to below 9.5 (the upper limit in the municipal sewer use by-law) before being dumped, or
2. The solutions be held and bled out with the other effluents at a rate such that the pH of the combined effluent is acceptable.
3. The wastes be diverted to the municipal sanitary sewer.

BELLEVILLE MUNICIPAL SURVEY - 1967

MORCH MANUFACTURING LIMITED
11 Water Street

SUMMARY

This plant manufactures tools, dies and aircraft parts and does custom metal machining and fabricating. The plant has a small metal plating section.

The plating wastes, which are discharged to a sand bed behind the plant, are the only significant source of industrial wastes, except for uncontaminated cooling water.

DETAILS OF SURVEY

Description of Plant and Processes

This plant manufactures tools, dies, jigs and aircraft parts and does custom and captive metal plating, precision machining, fabricating and welding.

The plating section includes chromium and cadmium cyanide plating and sulphuric and chromic acid aluminum anodizing operations.

Production and Operating Data

Number of employees - 30

Operating schedule - 8 hours/day, 7 days/week

Water Usage, Liquid Wastes and Waste Flows

Approximately 5,000 to 10,000 GPD of water is received from the municipal supply. It is estimated that plating wastes, which are the only

source of significant industrial wastes, are about 3,000 to 5,000 GPD. These wastes are discharged to a sand bed on plant property where they are absorbed into the ground.

Other wastes are discharged to a septic tank-tile bed system.

DISCUSSION AND CONCLUSIONS

Because of the small quantity of wastewater and the land disposal provided, samples of the plating room effluent were not collected. The industrial waste loadings from this plant would not have a significant effect on the present or proposed municipal sewerage system if they are discharged to this system at some future data.

BELLEVILLE MUNICIPAL SURVEY - 1967

NORTHERN ELECTRIC COMPANY LIMITED
250 Sidney Street

SUMMARY

This plant manufactures electronic equipment for the communications industry. Wastewaters from the plant's diversified plating department are the most significant industrial waste effluents.

Because of internal sewer arrangements, plant wastewaters are discharged to both the municipal storm and sanitary sewers. The effluent discharged to the sanitary sewer is satisfactory, but slightly high cyanide and copper concentrations in the discharge to the storm sewer will require a special effort on the part of plant management to keep these wastes to a minimum.

DETAILS OF SURVEY

Description of Plant Processes

This plant manufactures electronic equipment for the communications industry. The main plant operations consist of metal working, surface treatment of metal parts, printed circuit manufacturing and the associated assembly work, inspection and shipping. The metal treatment is carried out in a diversified metal electroplating department.

Operations performed in the plating department are summarized as follows:

Plating - zinc, tin, nickel, cadmium, copper.

Steel phosphatizing.

Chromic and sulphuric acid anodizing (infrequent use at present).

Deoxidizing.

Acid treatment - hydrochloric, nitric, sulphuric, phosphorus.

Paint stripping - solvent.

Organic degreasing.

Caustic treatment.

Some of these plating department operations are performed every day while others are performed only a few days a week or every other week.

Production and Operating Data

Number of employees - 850

Operating schedule - 8 hours/day, 5 days/week

Water Usage

Source	-	municipal supply
During survey (June 1)	-	209,000 GPD
Average in 1967	-	192,000 GPD
Average in minimum month	-	95,000 GPD
Average in maximum month	-	297,000 GPD

Sources and Disposal of Liquid Wastes

The source of the most significant industrial wastes from this plant is the plating department. Other sources of wastewater are painting booths, sanitary facilities, cooling waters and boiler blowdown.

The plating department effluent is pretreated for pH control before discharge. Because of internal sewer arrangements, plating and other industrial wastes are discharged to both the municipal sanitary and storm sewers. Sanitary wastes are all discharged to the municipal sanitary sewer.

Waste flows for the day on which the survey samples were collected were estimated as follows:

		GPD
1. Sanitary sewer -	plating wastewaters	64,000
	sanitary and other wastewaters	16,250
		80,250
2. Storm sewer -	plating wastewaters	64,000
	other wastewaters (excl. sanitary)	27,670
		91,670
3. Other sewer outfalls to sanitary sewer -	sanitary and cooling wastewaters	37,300
		209,220

Cyanide solutions are shipped to Toronto for destruction when it is necessary to renew cyanide tanks.

Sampling and Analysis

The company has been submitting samples of the sanitary and storm sewer wastes periodically for the last few years. These samples, and the ones obtained during this survey, were composited of aliquots collected at approximately 1-hour intervals during a normal 8-hour operating day by plant personnel. All samples were analysed at the OWRC

laboratories in Toronto according to the methods described in "Standard Methods for the Examination of Water and Wastewater", 12th edition.

The results of the analysis of the samples obtained during the survey are compared with the average of the results from the other samples submitted in recent months in the table in the following section.

WASTE LOADINGS*

Basis: Loading calculated from average concentrations
Waste flows: Sanitary sewer - 80,000 GPD
Storm sewer - 92,000 GPD

* Excludes "other sewer" wastes containing only sanitary wastes and cooling waters

Waste Characteristic	Sanitary Sewer Concentration ppm		Waste Loading lb./day	Storm Sewer Concentration ppm		Waste Loading lb./day
	Survey	Avg		Survey	Avg	
BOD_5	84	60	48	36	4	3.6
Suspended Solids	514	400	320	110	40	37
Cyanide, as HCN	0	0	0	0	1	0.9
Chromium, as Cr	0.03	0	0	0.1	0.1	0.09
Zinc, as Zn	0.7	0.7	0.56	5.2	5	4.6
Copper, as Cu	3.89	7	5.6	1.46	2	1.8
Nickel, as Ni	0.06	0	0	0.11	0	0
Cadmium, as Cd	0	0	0	0	0.1	0.09
Tin, as Sn	0.24	-	0.2	1.96	-	1.8
Iron, as Fe	38.8	50	40	2.3	2	1.8

DISCUSSION AND CONCLUSIONS

The suspended solids and copper concentrations in the effluent discharged from the plant sanitary sewer are slightly above the limits set in the municipal sewer use by-law for discharges to municipal sanitary sewers. Similarly, the suspended solids, copper and cyanide concentrations in the effluent discharged from the plant storm sewer are slightly above the limits set in the by-law for discharges to municipal storm sewers.

The level of wastes now being discharged to the municipal sanitary sewer will not adversely affect the operation of the proposed new secondary sewage treatment facilities. Appropriate attention by plant personnel, particularly in the plating department, to minimizing the wastes which now slightly exceed the various concentration limits, should result in concentrations which are acceptable in both the municipal sanitary and storm sewers.

RECOMMENDATIONS

It is recommended that plant personnel increase their efforts to minimize plating department waste concentrations, particularly those containing cyanides and/or copper. An effort should also be made to identify major sources of suspended solids in the effluent to the municipal storm sewer and reduce or eliminate them wherever possible.

BELLEVILLE MUNICIPAL SURVEY - 1967

REID'S DAIRY COMPANY LIMITED
17 Park Street

SUMMARY

Except for sanitary wastes, all liquid wastes from this milk bottling plant are discharged to a municipal storm sewer. These wastes would not adversely affect the present municipal sewerage system or the operation of the proposed secondary sewage treatment facilites.

Since the concentrations of these wastes exceed the limits set in the proposed municipal sewer use by-law for discharges to storm sewers, it is recommended that they be diverted to the municipal sanitary sewer.

DETAILS OF SURVEY

Plant Operations and Operating Data

Operations at this dairy include bottle washing and the pasteurizing, homogenizing and bottling of milk.

Number of employees - 6

Operating schedule - 8 hours/day, 5 days/week

Milk processed - 16,000 lbs./day

Water Usage

Source - municipal supply

During survey - 6,300 GPD

Average in 1967 - 5,500 GPD

Average in minimum month - 3,500 GPD

Average in maximum month - 7,500 GPD

Sources and Disposal of Liquid Wastes

The main sources of liquid wastes are uncontaminated cooling water, bottle washer running rinse, floor washings and equipment clean-up wastes. All wastewaters, except sanitary wastes, are discharged to a municipal storm sewer.

At infrequent intervals, the bottle washing alkaline cleaner solution (about 200 gallons) is also discharged to the storm sewer.

Sampling and Analysis

A composite sample of the total plant effluent (excluding sanitary wastes) was collected from 7:45 AM to 2:30 PM on May 4, 1967. A grab sample of the alkaline cleaner solution was also collected.

The samples were returned to the OWRC Toronto laboratories for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. Results of the analysis are included in the table in the following section.

WASTE CONCENTRATIONS AND LOADINGS

It was reported that the average quantity of milk processed daily during the year is approximately the same as on the day of the survey. Therefore, the waste loading estimated below should represent the normal daily waste load from this source. Because of cooling water requirements, the hydraulic loading varies as indicated by the range in the water usage data.

WASTE CONCENTRATIONS AND LOADINGS

	Concentration ppm	Loading lbs./day
Total Plant Effluent		
BOD_5	665	42
Suspended Solids	2,078	131
Alkaline Cleaner Solution		
BOD_5	930	-
Suspended Solids	36,000	-
pH	12.7	

CONCLUSIONS AND RECOMMENDATIONS

The concentrations of BOD_5 and suspended solids in the effluent from this dairy considerably exceed the limit of 15 ppm set for these wastes in the municipal sewer use by-law for discharges to storm sewers.

While these concentrations also exceed the limits of 300 and 350 ppm respectively, for discharges to sanitary sewers set in the by-law, the relatively small quantity of wastes would not adversely affect the operation of the present municipal sewage treatment plant or the proposed secondary sewage treatment facilities.

It is recommended that all wastes from this plant except uncontaminated cooling water be discharged to the municipal sanitary sewer. When this change has been made, it is further recommended that the pH of the alkaline cleaner tank solution be reduced below 9.5 before discharge to the sewer.

BELLEVILLE MUNICIPAL SURVEY - 1967

ROBLIN DAIRY LIMITED
194 Coleman Street

SUMMARY

Waste loadings from the milk bottling processes at this dairy will not adversely affect operations at the present municipal sewage treatment plant or the proposed secondary sewage treatment facilities.

DETAILS OF SURVEY

Plant Operations and Operating Data

Operations at this dairy include can and bottle washing and the bottling of milk, buttermilk and cream.

Number of employees - 6

Operating schedule - 7 hours/day, 6 days/week

Milk processed - 16,500 lbs./day

Water Usage

Source - municipal supply

During survey - 20,000 GPD

Average in 1967 - 20,000 GPD

Average in minimum month - 16,000 GPD

Average in maximum month - 26,000 GPD

Sources and Disposal of Liquid Wastes

The main sources of liquid wastes are uncontaminated cooling water, spillages, equipment clean-up and floor washing waters and bottle

washing machine running rinse. Other sources are the bottle washing machine alkaline cleaner and still rinse tanks which are dumped about twice each year and the can washing machines.

All wastewaters are discharged to the municipal sanitary sewer.

Sampling and Analysis

Composite samples were collected on June 2, 1967 from both the milk receiving room and can washing floor drains, and from the bottle washing machine running rinse. Grab samples were taken from the bottle washing machine still rinse and alkaline cleaner tanks.

The samples were returned to the OWRC Toronto laboratories for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. Results of the analysis are included in the table in the following section.

WASTE CONCENTRATIONS AND LOADINGS

The waste concentrations and the waste loadings estimated from them are as follows:

WASTE CONCENTRATIONS AND LOADINGS

	Waste Flow GPD	BOD_5 Conc'n ppm	BOD_5 Loading lb./day	Suspended Solids Conc'n ppm	Suspended Solids Loading lb./day
Milk Receiving Room	9,300*	700	65	270	25
Bottle Washing Running Rinse	1,100	20	0.2	12	0.1
Can Washing Machine	100	1,040	1	440	0.4
Cooling Water (Refrigerator)	9,500	-	-	-	-
Total Loadings and Average Concentrations	20,000	330	66	130	26

* Includes pasteurizer plate cooler cooling water

The loadings added when the bottle washing machine alkaline cleaner and still rinse tanks are dumped are estimated as follows:

	Waste Volume Gallons	pH	BOD_5 Conc'n ppm	BOD_5 Loading lbs.	Suspended Solids Conc'n ppm	Suspended Solids Loading lbs.
Alkaline Cleaning Tank	300	13*	7,800	23	1,566	5
Still Rinse Tank	80	12.5	1,500	1.2	494	0.4

* Estimated

CONCLUSIONS AND RECOMMENDATIONS

The BOD_5 concentration in the effluent slightly exceeds the limit of 300 ppm set in the municipal sewer use by-law but the difference

is not considered to be significant because of the relatively small volume of this waste.

The waste loadings from this dairy will not adversely affect the operation of the present municipal sewage treatment plant or the proposed secondary sewage treatment facilities.

BELLEVILLE MUNICIPAL SURVEY - 1967

STEWART-WARNER CORPORATION OF CANADA LIMITED
349 McDonald Avenue

SUMMARY

This plant manufactures lubricating systems and equipment, casters, automotive hardware and electronic equipment. The plant includes a metal plating department which is the main source of industrial wastes.

The wastes from the plating department were characterized by concentrations of cyanide and nickel in excess of recommended limits. Excluding sanitary wastes, other wastewaters were essentially uncontaminated cooling water and were not significant from the point of view of industrial wastes loads.

The waste load of heavy metals from this plant is unlikely to significantly affect the municipal sewage treatment plant or the proposed secondary sewage treatment facilities. However, it represents a substantial portion of the total load of this type of waste within the municipality. It is recommended, therefore, that plant management review plating room equipment and procedures to determine what means can be adopted to minimize these wastes.

Although dilution in the sewer system will be adequate to reduce cyanide concentrations to a safe level before the wastes reach the municipal sewage treatment plant, a potential hazard exists in the sewers in the vicinity of the plating department discharge. It is essential that the company provide suitable treatment for these wastes before they are discharged to the municipal sanitary sewer.

DETAILS OF SURVEY

Description of Plant and Processes

The main operations in the plant involve metal working and the fabrication and assembly of metal and electronic equipment. Except for uncontaminated cooling water, these operations result in little industrial wastes.

The plant includes a plating department which is mainly engaged in zinc and cadmium cyanide plating. Chromium, nickel, copper, brass and tin plating are less frequently done. This department also includes brazing and cyanide case hardening treatment equipment.

Production and Operating Data

Number of employees - 215

Operating schedule (Plating Department) - 18 hours/day

Water Usage

Source	- municipal supply
During survey month	- 61,000 GPD
Average in 1967	- 57,000 GPD
Average in minimum month	- 50,000 GPD
Average in maximum month	- 68,000 GPD

Sources and Disposal of Liquid Wastes

The only significant source of industrial wastewaters in this plant is the plating department operations.

Uncontaminated cooling water from elsewhere in the plant is used to supply the plating department needs. The wastewaters from this department arise mainly from the running rinses after plating and the cyanide case hardening quench tank continuous overflow.

All plating department wastewaters are directed to a sump from which they are discharged to the municipal sanitary sewer.

All sanitary wastes from the plant are collected in another plant sewer system and are also discharged to the municipal sanitary sewer. It is believed that all other wastes are also discharged to a municipal sanitary sewer, but plant personnel did not have definite information concerning this portion of the wastes.

During the sampling period of the survey, rough estimates of the plating room effluent flow were made. These indicated a total effluent from this department of 13,500 gallons during the 18 hours in which the department operates.

Sampling and Analysis

It was not possible to sample the wastes in the main collection sump because of its location under a plating tank. However, the three channels leading to the sump were sampled. Composite samples from each of these channels were made up by collecting aliquots at half-hour intervals from 10:00 AM to 4:00 PM on May 30, 1967.

These samples were returned to the OWRC laboratories in Toronto for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. Results of

the analysis are as follows (concentrations in parts per million):

RESULTS OF SAMPLE ANALYSIS

Sample No. (Channel No.)	Flow Rate GPD	Cyanide as HCN	Nickel as Ni	Zinc as Zn	Cadmium as Cd	Copper as Cu	Tin as Sn
2	3,950	16.8	-	0.8	9.5	0.14	-
3	2,900	152.8	-	-	-	-	-
4	11,300	49.2	19.5	5.1	-	0.94	-
Weighted Average*		59	12	3	2	0.6	-
	* Weighted according to flow rate						

WASTE LOADINGS

Waste loadings from the plating department are estimated as follows by assuming that the wastes would be discharged during a period of 18 hours per operating day and by using the weighted average concentrations shown above:

Plating Department Waste Loading - lbs./day

	Plating Wastes	Case Hardening Quench Bath	Total Loading
Cyanide, as HCN	4.6	3.3	7.9
Nickel, as Ni	1.6	-	1.6
Zinc, as Zn	0.4	-	0.4
Cadmium, as Cd	0.3	-	0.3
Copper, as Cu	0.1	-	0.1

CONCLUSIONS AND RECOMMENDATIONS

The concentrations of cyanide and nickel in the plating department effluent exceed the maximum limits of 3 and 5 ppm respectively, set in the municipal sewer use by-law.

With the dilution available in the municipal sewerage system, it is unlikely that the heavy metals from this plant will affect the operation of the municipal sewage treatment plant or the proposed secondary treatment facilities. However, these wastes represent a substantial portion of the total waste load of heavy metals in the municipal sewerage system. It is recommended, therefore, that plant management review plating room procedures to determine what means can be adopted to minimize these wastes.

Although sewage flow in the sewer system will be adequate to dilute the cyanide wastes to a safe level before they reach the treatment plant, a potential hazard exists in the sewers in the vicinity of the plating department discharge. It is essential that the company provide

treatment for the total plating department effluent before discharge to eliminate the cyanide or reduce it to acceptable safe levels. If technically feasible, the use of a still quench tank for the case hardening operation might be considered. The cyanide in the still quench tank could be destroyed whenever it was periodically necessary to discharge this tank.

BELLEVILLE MUNICIPAL SURVEY - 1967

TEND'R CHIC LIMITED
249 Station Street

SUMMARY

This plant produces deep fried and frozen deep fried chicken from chickens slaughtered, cleaned and sectioned elsewhere. The pre-frying cooking and chilling waters are the main sources of liquid wastes. These, and sanitary wastes, are discharged to a municipal sanitary sewer.

The small volume of wastewaters and waste loading from this plant preclude its operations adversely affecting the present or proposed municipal sewage treatment facilities. Special precautions should be taken to ensure that fatty materials are eliminated from the wastewaters before discharge.

DETAILS OF SURVEY

Plant Operations and Operating Data

The chicken sections are boiled in hot water, chilled in running water, stored in cold storage, crumbed, deep fried and either sold in a take-out service or deep frozen for subsequent sale.

The plant operates 16 hours/day, 5 days/week and employs 10 people.

Water Usage and Sources and Disposal of Wastewater

Water usage is estimated to be about 2,500 GPD based on usage during the survey period. The water is used in the cooking and chilling

of the chicken and for sanitary purposes. Essentially all of the water delivered to the plant is later discharged to a municipal sanitary sewer as wastewater.

Sampling, Analysis and Waste Loading

A composite sample of the total plant effluent was obtained on May 5, 1967 and was returned to the OWRC Toronto laboratories for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. Results of the analysis are shown below:

WASTE CONCENTRATIONS AND LOADINGS
(Waste Flow = 2,500 GPD)

	Concentration ppm	Loading lb./day
BOD_5	335	8.4
Dissolved Solids	140	3.5
Suspended Solids	724	18.1

CONCLUSIONS AND RECOMMENDATIONS

The concentrations of BOD_5 and suspended solids in the plant effluent exceed the limits of 300 and 350 ppm respectively, set in the municipal sewer use by-law for discharges to sanitary sewers. However, because of the small waste loading from this plant, the wastes should not adversely affect the present or proposed municipal sewage treatment facilities.

Although fatty materials did not appear to be present in significant quantities in the samples collected, boiling operations of the type carried out at this plant often result in liquified fats being carried over into the sewers. This can result in sewer blockages if the fats congeal and collect in the sewer. It is recommended that the company ensure that substantially all fatty material is eliminated from the wastewaters before they are discharged to the municipal sanitary sewer.

BELLEVILLE MUNICIPAL SURVEY - 1967

UNION CARBIDE CANADA LIMITED
CHEMICALS AND RESINS
621 Dundas Street East

SUMMARY

This plant produces phenolic resins from phenol and formaldehyde. The main sources of liquid industrial wastes are the distillates and caustic and water washes from the resin production still pots. The company has arranged for acceptable disposal of the distillates at another location and is investigating the feasibility of disposing of the washes, together with sanitary wastes, to the municipal sanitary sewer.

Because of the relatively high phenolic loading in the wash waters, it is recommended that acceptance of these wastes into the municipal sanitary sewer be conditional upon the concentration of phenols in the sewage treatment plant effluent not exceeding an acceptable level.

DETAILS OF SURVEY

Plant Operations and Sources of Liquid Wastes

The main operations at this plant consist of the production of:

1. Phenolic resins from phenol and formaldehyde.
2. Hexamethylenetetramine from ammonia and formaldehyde.
3. Formaldehyde from methanol.
4. Phenol formaldehyde resin moulding compounds.
5. Phenolic resin impregnated papers and boards.
6. Polyethylene/carbon black master batches.

The main source of liquid wastes in the plant, excluding relatively uncontaminated cooling waters which arise from all processes, is the production of the phenolic resins from phenol and formaldehyde. A wide range of these resins is produced by reacting phenol and formaldehyde in still pots under reflux conditions followed by distillation to remove excess phenol and unwanted intermediate reaction products. Periodically the still pots are washed first with a caustic solution and then with two water washes. The main liquid wastes from this process are the distillates and the caustic and water washes.

Waste Disposal, Characteristics and Loadings

The effluents from the formaldehyde and hexamethylene-tetramine processes consist of uncontaminated cooling water which is discharged to a swampy area south of the plant.

Until recently the phenolic resin distillates, which were the main source of phenolic wastes, were treated in a phenol recovery unit. Use of this unit has now been discontinued and the distillates are now being shipped to Toronto where phenol is recovered. Arrangements for discharging the still washes (after neutralization) and sanitary wastes to the municipal sanitary sewer are currently being investigated.

Based on data available at this time, a rough estimate of the expected loadings to the municipal sanitary sewer would be:

	Estimated Waste Loadings			
	Flow GPD	BOD_5 lbs./day	Suspended Solids lbs./day	Phenolics lbs./day
Still Caustic Washes	6,000	150	30	15
Still Water Washes	18,000	25	6	5
Sanitary Wastes	5,000	9	15	-
Total	29,000	184	51	20

It should be noted that these estimates are derived from data of unknown accuracy. A survey of this plant, separate from this study, to more accurately defined these wastes has been completed and a further report will be prepared when the results of the analysis of the samples collected are known.

CONCLUSIONS AND RECOMMENDATIONS

The BOD_5 and suspended solids loadings which Union Carbide Canada Limited is proposing to discharge to the municipal sanitary sewer should not, in themselves, create any problems in the present sewerage system or the proposed secondary sewage treatment facilities. However, the phenolic loading from the wastes may result in unacceptably high phenol concentrations in the sewage treatment plant effluent.

It is unlikely that periodic discharges of highly concentrated phenolic wastes would be significantly reduced in the proposed expanded

sewage treatment plant. However, if they are fed to the municipal sanitary sewers in a continuous flow with a relatively uniform phenol concentration, the organisms in the activated sludge section of the plant would become acclimatized and might eliminate up to 90 - 95 percent of the phenols. With this level of treatment, the total phenol load which could be accepted would still be limited, if the treatment plant effluent is to have a phenol concentration below the 20 ppb now considered to be a maximum limit.

The BOD_5 and suspended solids loadings, when considered separately from the phenolic content, will not adversely affect the present or proposed sewage treatment facilities.

It is recommended that acceptance of the industrial wastes from this plant into the municipal sewerage system be conditioned upon the phenol concentration of the sewage treatment plant effluent remaining at an acceptable level.

BELLEVILLE MUNICIPAL SURVEY - 1967

VAGDEN MILLS LIMITED
111 Bay Drive

SUMMARY

The plant knits and dyes nylon, acrylic ("Orlon"), cotton and wool socks. Processing wastes essentially consist of spent dye and treatment baths and rinse waters. All wastes are discharged to the municipal sanitary sewer.

Wastes from this plant will have no adverse effect on the present municipal sewage treatment plant or on the proposed secondary treatment facilities. The low pH of some of the wastes may accelerate corrosion in the receiving sewer line. However, considering the relatively low volume of these wastes, adequate dilution should be available in the sewer system to confine the potential effect of the low pH wastes, if any, to the immediate vicinity of the plant.

It is suggested that the municipality review its experience with these sewers before requesting the company to provide pretreatment facilities since the cost of installing and operating these facilities is likely to be high and may be out of proportion with the effect of the wastes.

DETAILS OF SURVEY

Plant Operations and Sources of Liquid Wastes

Waste-producing operations at this plant consist of the dyeing of nylon, acrylic ("Orlon"), cotton and wool fibre socks, dye stripping,

sanitizing, softening and rinsing. These operations are all batch-type and are carried out in 200 - 500 gallon baths. Details of the operations are as follows:

1. Nylon ..... Approximately 6 dye batches per day plus at least one rinse bath per batch.
2. "Orlon" ..... Approximately 1 dye batch per day followed by at least one rinse bath. Two types of "Orlon" dye bath are used, half of the "Orlon" being dyed in each type. One bath contains the dye and sulphuric and acetic acids. The other bath contains the dye and a dispersant.
3. Wool ..... Approximately 2 batches per day, each followed by at least one rinse bath.
4. Cotton ..... Approximately 5 batches once per month.
5. Optical White Approximately 2 batches per week.
6. Dye Strip ... This operation to strip the colour from dyed fabrics is carried out on Saturdays only. Two batches of a hydrosulphite solution are used for stripping each week.
7. Sanitizing .. Approximately 10 batches are processed each day.
   and Half of the batches contain both a sanitizer and
   Softening a softener. The other half contain a softener only.

The process waste essentially consists of the spent dye and other bath solutions and the rinse waters. All process and sanitary wastes are

discharged to a municipal sanitary sewer.

The plant operates on a multi-shift basis but dyeing and associated operations are carried out only on the day shift. The plant basically operates 5 days per week. The total number of employees is about 110.

Water Usage

Source	-	municipal supply
During survey	-	7,800 GPD
Average in 1967	-	7,800 GPD
Average in minimum month	-	7,000 GPD
Average in maximum month	-	9,800 GPD

Sampling and Analysis

Samples of spent bath solutions and rinse waters were collected on May 4, 1967 and were returned to the OWRC Toronto laboratories for analysis according to the procedures described in "Standard Methods for the Examination of Water and Wastewater", 12th edition. Results of the analysis are appended.

During the collection of samples, it was noted that the spent hydrosulphite solution sample represented a solution containing a lower than normal concentration of stripped dye.

WASTE CONCENTRATIONS AND LOADINGS

The wastes from this plant are characterized by high BOD_5 and COD concentrations. The spent dye baths and the associated rinse waters, exhibit pH values below the minimum limit of 5.5 set in the municipal sewer use by-law.

Assuming a waste flow of about 7,000 GPD and an average processing day as represented in the outline above, the process waste loadings from the plant have been estimated as follows:

Waste Characteristic	Estimated Total Plant Effluent	
	Concentration ppm	Loading lb./day
BOD_5	800	56
COD	3,500	245

CONCLUSIONS AND RECOMMENDATIONS

The average BOD_5 concentration of 800 ppm estimated for the total plant effluent considerably exceeds the limit of 300 ppm set in the municipal sewer use by-law for discharges to sanitary sewers. The high ratio of COD to BOD suggests the possibility that these wastes may not be completely treated in the secondary treatment facilities proposed for the municipal sewage treatment plant. However, considering the relatively low loading of these wastes, it is unlikely that they will adversely affect the present or proposed treatment facilities.

The low pH of some of the solutions discharged may accelerate corrosion in the receiving sewer but because of their small volume adequate dilution should be available in the sewer system to confine the effect, if any to the immediate vicinity of the plant.

It is suggested that the municipality review its experience with these sewers before requesting the company to provide pretreatment facilities since the cost of installing and operating these facilities is likely to be high and may be out of proportion with the effect of the wastes.

APPENDIX A

BELLEVILLE MUNICIPAL SURVEY - 1967

SIGNIFICANCE OF WASTE CHARACTERISTIC AND ANALYTICAL RESULT TERMINOLOGY

1. BOD_5 ..... The biochemical oxygen demand or BOD is an indication of the quantity of oxygen required by biological processes in natural waters or sewage treatment plants to stabilize or render inert the organic material contained in the wastewater tested. It is therefore a measure of the pollutional effect of effluents containing essentially organic wastes.

2. COD ..... The chemical oxygen demand or COD is an indication of the oxygen required to stabilize or render inert all oxidizable materials, including those measured in the BOD_5 test, contained in the wastewater tested. It is particularly applicable to inorganic industrial wastes or those organic wastes which are difficult to stabilize by biological processes.

3. Total Solids ... Total solids is a measure of the total of the dissolved and suspended solids contained in the water tested.

4. Dissolved Solids ... Dissolved solids are essentially those solids which are in solution in the wastewater.

5. Suspended Solids ... Suspended solids are those solids which are filtered from the wastewater by a standard laboratory method. A high concentration of suspended solids can result in the clogging or blocking of sewers and in an extreme case can create problems in some sewage treatment plants.

6. pH ..... The pH of a solution is a measure of its acidity or alkalinity. A pH of 7 represents a neutral solution. As the pH decreases from 7, the acidity of the solution increases. Increasing pH's above 7 indicate an increase in alkalinity. Wastewaters having a pH considerably above or below 7 can result in accelerated corrosion of sewer lines, precipitation of solids in the sewer lines or treatment plants and in extreme cases, can upset biological processes in sewage treatment plants containing secondary treatment facilities.

7. Ether Solubles ... The ether solubles test measures the amount of oil and grease-like material in the wastewater. Excessive quantities of these materials can block sewer lines and affect secondary sewage treatment facilities and have serious aesthetic and biological effects when discharged to natural watercourses.

8. Phenols ..... This test measures the concentration of phenol and phenol-like materials in the wastewater. Phenols, even in minute concentrations, impart an unpleasant taste to water which is accentuated on chlorination. The presence of phenols in water is often an indication of industrial pollution.

9. Cyanide ..... The cyanide test indicates the presence of the cyanide ion. Under acid conditions, cyanide compounds produce hydrogen cyanide which is extremely toxic to humans. Cyanides are associated with industrial wastes such as those from metal hardening and plating processes.

10. Sulfates ..... Sulfates, when combined with the calcium and magnesium in water, form precipitates which can cause scale build-up on sewer lines.

11. Metals ..... Many metallic ions are toxic to biological processes whether they occur in natural watercourses or secondary sewage treatment plants. Some are toxic to higher forms of animal life, such as fish, when present in the animals habitat. Some metals, such as iron, are reported to have a beneficial effect on sewage. The metallic ions usually considered to be most toxic are: copper, chromium, nickel, lead, cadmium, zinc. Other metallic ions, such as silver, gold cobalt, manganese and tin, normally do not have harmful effects in the concentrations usually found in industrial wastes.

APPENDIX B

BELLEVILLE MUNICIPAL SURVEY - 1967

DRY INDUSTRIES

The following is a list of those industries which were found to have negligible liquid wastes or which had acceptable means of waste disposal other than discharge to a municipal sanitary sewer. These industries are classified as dry industries.

Company	Type of Industry	Wastes	Waste Disposal
Aluminum Star Products Ltd.	Metal castings and subsequent decoration	Sanitary only	Municipal sanitary sewer
Amplifone Canada Ltd.	Electronic components and equipment assembly	Sanitary only	Municipal sanitary sewer
Bell Shirt Co. Ltd.	Shirt manufacturing	Sanitary only	Municipal sanitary sewer
Canadian Welding Gases Ltd.	Distribution of welding supplies	Sanitary only	Municipal sanitary sewer
Culligan Water Conditioning Service	Distribution and servicing of water deionizers and water softeners. Regeneration of deionizers	Sanitary wastes Sodium chloride regeneration wastes	Municipal sanitary sewer Municipal storm sewer

Company	Type of Industry	Wastes	Waste Disposal
Deacon Bros. Sportswear Ltd.	Sportswear manufacturing	Sanitary only	Municipal sanitary sewer
Electronic Controls Ltd.	Assembly of educational scientific display apparatus	Sanitary wastes Paint booth water	Private septic tank system Land disposal on site
Wm. Finkle Machine Co.	Machinery sales and service only	Sanitary only	Municipal sanitary sewer
Foley Supply and Machine Co. Ltd.	Metal machining and fabricating, welding supplies, etc.	Sanitary only	Municipal sanitary sewer
G. T. Lanning Ltd.	Manufacture of straw hats	Sanitary only	Municipal sanitary sewer
Lon's Stone Works Ltd.	Memorial monuments	Sanitary and uncontaminated compressor cooling water	Municipal sanitary sewer
McFarlane Gendron Mfg. Co. Ltd.	Manufacture of game tables, nursery furniture, etc.	Sanitary only	Private septic tank system

Company	Type of Infustry	Wastes	Waste Disposal
Morch Mfg. Ltd.	Metal working and fabricating. Small plating operation	Sanitary wastes Cooling and wash waters	Municipal sanitary sewer Land disposal on site
Stephens-Adamson Mfg. Co. of Canada Ltd.	Metal working and fabricating	Sanitary and uncontaminated cooling waters	Municipal sanitary sewer
York Trading Ltd.	Warehousing and distribution of wholesale groceries	Sanitary only	Municipal sanitary sewer
Wilson Concrete Products Ltd.	Manufacture of precast and prestressed concrete products	Sanitary wastes Wash waters	Municipal sanitary sewer Subterranean land disposal

APPENDIX C

BELLEVILLE MUNICIPAL SURVEY - 1967

WET INDUSTRIES

Average 1967 Industrial Water Usage, Waste Flows and Waste Loadings

(NOTE: In terms of MGD and lbs./day, day refers to operating day in the industry concerned)

Company	Operating Schedule		Water Usage MGD	Estimated Waste Flow MGD			Waste Loading lb.BOD_5/day		Comments
	Days/ week	Hours/ day		To Sanitary Sewer	To Storm Sewer	To other	To Sanitary Sewer	To Storm & other	
American Optical	5	16	0.113	0.113	0.0	0.0	68	0	High suspended solids and iron loading
Avon Jewellery	5	8	0.006	0.006	0.0	0.0	N**	0	Plating wastes
Belleville Creameries	6	8	0.004	0.004	0.0	0.0	60	0	
Canadian National Railways	5	8	0.155	0.0	0.0	0.125	0	25	Effluent to Moira River & to drainage ditch
Carm's Beverages	4	8	0.007	0.007	0.0	0.0	9	0	
Coca-Cola	4	8	0.025	0.025	0.0	0.0	30	0	

Company	Operating Schedule		Water Usage MGD	Estimated Waste Flow MGD			Waste Loading lb.BOD_5/day		Comments
	Days/ week	Hours/ day		To Sanitary Sewer	To Storm Sewer	To other	To Sanitary Sewer	To Storm & other	
Deloro Stellite	5	8	0.030	0.0	0.0	0.030	0	N**	Effluents to septic tank & drainage ditch
Dussek Bros.	5	8	0.011	0.011	0.0	0.0	20	0	High ether solubles & inorganic concentrations
Glen Roy Creamery	5	8	0.031	0.031	0.0	0.0	84	0	
W.T. Hawkins	3	10	0.036	0.036	0.0	0.0	446	0	
International Hardware	5	8	0.062	0.062	0.0	0.0	N**	0	Plating wastes
Lecithin Products	5	8	0.015	0.015	0.0	0.0	106	0	High ether solubles & solids concentrations
Mead Johnson	5	24	0.109			0.109	30	0	Effluents to sanitary sewer and drainage ditch
Moira Beverages	4	8	0.019	0.0	0.0	0.019	0	142	Effluents to Moira River
Northern Electric	5	8	0.192	0.100	0.092	0.0	48	4	Plating wastes to both sewers

Company	Operating Schedule		Water Usage MGD	Estimated Waste Flow MGD			Waste Loading lb.BOD_5/day		Comments
	Days/ week	Hours/ day		To Sanitary Sewer	To Storm Sewer	To other	To Sanitary Sewer	To Storm & other	
Reid's Dairy	5	8	0.006	0.0	0.0	0.006	0	42	Effluents to Moira River
Roblin Dairy	6	7	0.020	0.020	0.0	0.0	66	2	
Stewart-Warner	5	16	0.057	0.057	0.0	0.0	N**	0	Plating wastes
Tend'r Chic	5	16	0.003	0.003	0.0	0.0	8	0	
Union Carbide	7	24	2.600	0.0	0.0	2.600*	0	184*	Effluents to Bay of Quinte & septic tanks
Vagden Mills	5	8	0.008	0.008	0.0	0.0	56	0	
				0.498	0.092	2.889	1,031	397	

* Based on inadequate data. Rough estimate only.

** Negligible industrial waste loading.

APPENDIX D

BELLEVILLE MUNICIPAL SURVEY - 1967

WET INDUSTRIES - PERSONNEL INTERVIEWED

Personnel interviewed during the surveys of the wet industries are listed below. Wet industries were defined as:

(a) Industries discharging industrial wastes to municipal sanitary sewers, or

(b) Industries discharging unacceptable wastes of any kind to storm sewers, drainage ditches or natural watercourses which might ultimately be discharged to the municipal sanitary sewer system.

COMPANY	PERSONNEL INTERVIEWED
American Optical Co. (Canada) Ltd.	P. Siegmund - Plant Manager
Avon Jewellery Limited	J. H. Mazer - General Manager
	R. Miller - Plating Room Foreman
Belleville Creameries Limited	H. West - Manager
Canadian National Railways	N. E. Field - Asst. Engineer Maintenance
Carm's Beverages Limited	C. A. Caverly - Manager - Owner
Coca-Cola Limited	L. Wallace - Plant Superintendent
	J. Ketcheson - Office Manager
Deloro Stellite	J. C. Houston - General Manager

Dussek Bros. (Canada) Limited	B. Walton - Plant Manager
Glen Roy Creamery	P. McNevin - Asst. Plant Manager
W. T. Hawkins Limited	J. E. Marker - V.P. & General Manager
	Mrs. S. J. Woodcox
International Hardware Company	H. W. Hanton - V.P. Manufacturing
	G. E. Brown - Chief Engineer
	C. Jenkinson - Plating Superintendent
Lecithin Products Limited	G. Hill - Plant Superintendent
Mead Johnson & Co. of Canada Ltd.	T. P. McWilliams - Plant Engineer
Moira Beverages	W. Spinelli - Manager
Northern Electric Co. Ltd.	D. Nash - Engineering Department
	W. Overy - Plating Room Supervisor
Reid's Dairy	W. Trendell - Manager
Roblin Dairy	R. Caterer - Manager
Stewart-Warner Corp. of Canada Ltd.	F. C. Ethier - Plant Manager
	W. J. Baxter - General Foreman
	T. W. Sherry - Maintenance Foreman
Tend'r Chic Limited	J. Orsthout - Manager - Owner
Union Carbide Canada Limited	J. C. Paquin - Department Head
Vagden Mills Limited	W. Andres - Plant Superintendent

APPENDIX E

BELLEVILLE MUNICIPAL SURVEY - 1967

THE CORPORATION OF THE CITY OF BELLEVILLE

BY-LAW NUMBER 8420

A BY-LAW TO CONTROL THE DISCHARGE OF SEWAGE INTO THE SEWAGE SYSTEM OF THE MUNICIPALITY PURSUANT TO PARAGRAPHS 69 AND 125 OF SUBSECTION 1 OF SECTION 379 OF THE MUNICIPAL ACT, R.S.O. 1960, CHAPTER 249.

WHEREAS it is expedient to prohibit and regulate the discharge of domestic sewage and industrial wastes into drains, sewers, sewer systems and sewage works.

NOW, THEREFORE, THE COUNCIL OF THE CORPORATION OF THE CITY OF BELLEVILLE ENACTS AS FOLLOWS:

1. In this by-law:

(a) "biochemical oxygen demand (BOD)" means the quantity of oxygen utilized in the biochemical oxidation of organic matter in five (5) days at twenty (20) degrees centigrade as determined in accordance with Standard Methods and expressed in milligrams per litre;

(b) "coliform count" means the number of all coliform bacteria and expressed in number of coliform bacteria per 100 millilitres of solution, as determined in accordance with Standard Methods;

(c) "colour of a liquid" means the appearance of a liquid, from which the suspended solids have been removed, as determined in accordance with Standard Methods;

(d) "combined sewer" means a sewer intended to function simultaneously as a storm sewer and a sanitary sewer;

(e) "matter" includes any gaseous, liquid or solid matter;

(f) "Municipality" means The Corporation of the City of Belleville.

(g) "person" includes a corporation, aggregate or sole;

(h) "pH" means the logarithm of the reciprocal of the concentration of hydrogen ions in grams per litre of solution;

(i) "phenolic compounds" means those hydroxy derivaties of benzene, or its condensed nuclei, which can be identified by the 4 - Aminoantipyrene method in accordance with Standard Methods, or the Gibbs procedures, as set out in the eleventh edition of Standard Methods for the Examination of Water and Wastewater;

(j) "sanitary sewer" means a sewer for the collection and transmission of domestic, commercial and industrial wastes or any of them;

(k) "sewage" includes drainage, storm water, commercial wastes, industrial wastes and wastewater;

(l) "sewage works" means all sewers, sewer systems, sewage pumping stations, sewage treatment plants and other works for the collection, acceptance, transmission, treatment and disposal of sewage or for any one or more of them;

(m) "Standard Methods" means, unless the context otherwise requires, the methods and procedures set out in the edition of "Standard Methods for the Examination of Water and Wastewater" published

by the American Public Health Association and current at the time of any examination of any sewage;

(n) "storm sewer" means a sewer for the collection and transmission of storm water runoff, drainage or sewage derived from the draining of land or any one or more of them;

(o) "suspended solids" means solid matter in or on a liquid, which matter is removable by filtering with a glass fibre filter paper equivalent to a Reeve Angel Glass Fibre Filter Paper, No. 934 AH.;

(p) "watercourse" means an open channel, ditch or depression, either natural or man-made, in which a flow of storm water occurs either continuously or intermittently.

2. No person shall discharge into land drainage works, private branch drains or connections to any sewer, sewer system or sewage works for the carrying away of domestic sewage or industrial wastes or both, which are connected directly or indirectly to the sewage system, (provided by the Ontario Water Resources Commission under an agreement between the Municipality and the Ontario Water Resources Commission and dated the first day of January A.D. 1968) any matter or quantity of matter which may be or become harmful to any sewage works or which may interfere with their proper operation, or which may impair or interfere with any sewage treatment process, or which may or may tend to obstruct any sewer, or which may be or may become a hazard to persons, property or animals, and, without limiting the generality of the foregoing, any of the following:

(a) sewage containing more than a total of 150 milligrams per litre of oil, fat and grease of animal and vegetable origin;

(b) sewage containing more than a total of 15 milligrams per litre of oil, grease and tar of mineral origin;

(c) sewage at a temperature in excess of 150 degrees fahrenheit;

(d) subject to subparagraph (b) hereof, flammable or explosive matter and without limiting the generality of the foregoing, gasoline, benzene, naphtha, fuel oil, acetone or other solvents;

(e) any quantity of matter capable of obstructing the flow in or interfering with the proper operation of any part of the sewage works, and without limiting the generality of the foregoing, any such quantity of ashes, cinders, garbage, sand, straw, mud, shavings, metal, glass, rags, feathers, plastic, wood or cellulose.

(f) sewage having a pH less than 5.5 or greater than 9.5 or which due to its nature or content, becomes less than 5.5 or greater than 9.5 during transmission to a sewage treatment plant;

(g) sewage of which the BOD exceeds 300 milligrams per litre;

(h) sewage in which suspended solids exceed 350 milligrams per litre;

(i) sewage which may cause a nuisance, and without limiting the generality of the foregoing, sewage containing hydrogen sulphide, carbon disulphide, ammonia, trichloroethylene, sulphur dioxide, formaldehyde, chlorine, bromine, or pyridine, in such quantity

that an offensive odour could emanate from the sewage works or could cause a nuisance;

(j) sewage containing animal waste, and without limiting the generality of the foregoing, containing intestines, stomach casings, intestinal contents, hides, hooves, toenails, horns, bones or poultry heads or sewage containing hair, wool, fur, feathers, paunch manure or fleshings in a quantity sufficient to interfere with the proper operation of the sewage works;

(k) sewage containing any of the following matter in excess of the indicated concentrations:

phenolic compounds	0.5 milligrams per litre
total cyanides, expressed as HCN	3 milligrams per litre
total sulphides, expressed as H_2S	3 milligrams per litre
total copper, expressed as Cu	5 milligrams per litre
total chromium, expressed as Cr	5 milligrams per litre
total nickel, expressed as Ni	5 milligrams per litre
total lead, expressed as Pb	5 milligrams per litre
total zinc, expressed as Zn	8 milligrams per litre
total cadmium, expressed as Cd	5 milligrams per litre

(l) radioactive materials except as may be permitted under the Atomic Energy Control Act R.S.C. 1952, Chapter 11, and amendments thereto and regulations thereunder.

(m) storm runoff, sewage derived from the drainage of lands or roofs or water used for cooling purposes.

3. No person shall discharge, cause or permit the discharge or deposit into or in (i) land drainage works, private branch drains or connections to any sewer, sewer system or sewage works for the carrying away of domestic sewage or industrial wastes or both, that are capable of discharging sewage into any well, lake, river, pond, spring, stream, reservoir, or other water or watercourse, or onto any shore or bank thereof, or into any place from which the sewage may be discharged into or deposited in any well, lake, river, pond, spring, stream, reservoir, or other water or watercourse, or, (ii) any storm sewer or any sewer connected to a storm sewer, any of the following:

(a) sewage at a temperature in excess of one hundred and fifty degrees fahrenheit (150 degrees F.);

(b) sewage containing more than a total of fifteen (15) milligrams per litre of fat, oil, grease and other matter which is soluble in ether;

(c) subject to subparagraph (b) hereof, flammable or explosive matter, and without limiting the generality of the foregoing, gasoline, benzene, naphtha, fuel oil, acetone or other solvents;

(d) any quantity of matter capable of obstructing the flow in or interferring with the proper operation of any part of the sewage works and without limiting the generality of the foregoing, any such quantity of ashes, cinders, garbage, sand, straw, mud, shavings, metal, glass, rags, feathers, plastics, wood, cellulose, tar, animal wastes or other matter that is not dissolved in a liquid at the time of its introduction into the sewage works;

(e) sewage containing any matter in a quantity or concentration that will or may cause death of or injury to any person, property or animal;

(f) sewage having a pH less than 5.5 or greater than 9.5 or which due to its nature or content becomes less than 5.5 or greater than 9.5 during transmission through the sewage works;

(g) sewage in which suspended solids content exceed fifteen (15) milligrams per litre or sewage containing any suspended solids which are incapable of passing through a screen having openings not larger than one quarter ($\frac{1}{4}$) of an inch square;

(h) sewage that has or may cause an offensive odour, and without limiting the generality of the foregoing, sewage containing hydrogen sulphide, carbon disulphide, ammonia, trichloroethylene, sulphur dioxide, formaldehyde, chlorine, bromine, pyridine, in such quantity that an offensive odour could emanate from the sewage works or could cause a nuisance;

(i) sewage of which the BOD exceeds fifteen (15) milligrams per litre;

(j) sewage containing coloured matter which sewage would require a dilution in excess of four (4) parts of distilled water to one (1) part of such sewage to produce a mixture the colour of which is not distinguishable from that of distilled water when tested in accordance with the Ontario Water Resources Commission Standard Laboratory Sewage Colour Determination Test;

(k) sewage containing toxic or poisonous matter in sufficient quantity to constitute a hazard to persons, property or animals, and, without limiting the generality of the foregoing, sewage containing any of the following matter in excess of the indicated concentrations:

phenolic compounds	0.020	milligrams per litre
total cyanides, expressed as HCN	0.1	milligrams per litre
total cadmium, expressed as Cd	1.0	milligrams per litre
total chromium, expressed as Cr	1.0	milligrams per litre
total copper, expressed as Cu	1.0	milligrams per litre
total nickel, expressed as Ni	1.0	milligrams per litre
total zinc, expressed as Zn	5.0	milligrams per litre
total iron, expressed as Fe	17.0	milligrams per litre
chlorides, as Cl	1500	milligrams per litre
sulphates, as SO_4	1500	milligrams per litre

(l) sewage in which the coliform count exceeds two thousand four hundred (2,400) per one hundred (100) millilitres as determined by Standard Methods;

(m) radioactive materials except as may be permitted under the Atomic Energy Control Act, R.S.C. 1952, Chapter 11, and amendments thereto and regulations thereunder.

4. Except as otherwise specifically provided in this by-law all tests, measurements, analyses and examinations of sewage, its characteristics or contents shall be carried out in accordance with Standard Methods.

5. The discharge of sewage that would otherwise be prohibited by this by-law may be permitted to an extent fixed by agreement with the Municipality under such conditions with respect to payment or otherwise as may be necessary to compensate for any additional costs of treatment. (Any such agreements shall be subject to the approval of the Ontario Water Resources Commission.)

6. Any person who contravenes any of the provisions of this by-law shall be liable upon conviction to a penalty not exceeding $300.00 exclusive of costs for each offence and a separate offence will be committed on each day on which a contravention occurs.

THIS BY-LAW shall come into force and take effect immediately on and after the passing thereof.

APPENDIX F

BELLEVILLE MUNICIPAL SURVEY - 1967

SUMMARY OF SUGGESTIONS AND/OR RECOMMENDATIONS CONCERNING THE INDUSTRIAL WASTEWATERS FROM INDIVIDUAL COMPANIES

Company	Suggestions and/or Recommendations
American Optical Co. Canada Ltd.	Increase frequency of removing settled solids from wastewater sumps.
Carm's Beverages Limited	Ensure adequate pH control of wastewaters and divert to municipal sanitary sewers.
Coca-Cola Limited	Review procedures to ensure carryover of cleaning solutions to the sewer are minimized.
Deloro Smelting & Refining Co. Ltd.	Divert sanitary wastes to the municipal sanitary sewer.
Dussek Brothers (Canada) Ltd.	Determine feasibility of diverting uncontaminated cooling water from the municipal sanitary sewer. Determine feasibility of discharging present batch dumps of concentrated inorganic wastes over an extended time period. Eliminate all oily materials from wastewaters before discharge to the municipal sanitary sewer.
Glen Roy Creamery & Frosty Lockers Limited	Determine feasibility of diverting some or all of the uncontaminated cooling water to a municipal storm sewer.

SUMMARY OF SUGGESTIONS AND/OR RECOMMENDATIONS CONCERNING
THE INDUSTRIAL WASTEWATERS FROM INDIVIDUAL COMPANIES

Company	Suggestions and/or Recommendations
W. T. Hawkins Limited	Review procedures to ensure that waste loadings in the plant effluent are minimized.
International Hardware Co. of Canada Ltd.	Review procedures to ensure that plating room waste discharges are minimized.
Lecithin Products Canada Ltd.	Investigate means to reduce or eliminate drum cleaning residues in the plant wastewater.
Moira Beverages Limited	Ensure adequate pH control of wastewaters and divert to municipal sanitary sewers.
Northern Electric Co. Ltd.	Review procedures to ensure that plating room waste discharges are minimized. Identify major sources of suspended solids in the effluent discharged to the municipal storm sewer and reduce or eliminate these wastes wherever possible.
Reid's Dairy Co. Ltd.	Ensure adequate pH control of all wastewaters and (excluding uncontaminated cooling water if possible) divert to municipal sanitary sewers.

SUMMARY OF SUGGESTIONS AND/OR RECOMMENDATIONS CONCERNING
THE INDUSTRIAL WASTEWATERS FROM INDIVIDUAL COMPANIES

Company	Suggestions and/or Recommendations
Stewart-Warner Corporation of Canada Ltd.	Provide treatment for cyanide wastewaters before discharge to the municipal sanitary sewer. Review procedures to ensure that plating room waste discharges are minimized.
Tend'r Chic Limited	Ensure that fatty materials are eliminated from wastewater before they are discharged.
Union Carbide Canada Limited	Acceptance of phenolic wastes in the municipal sanitary sewerage system should be conditional upon the concentration of phenols in the proposed expanded sewage treatment plant effluent not exceeding an acceptable level.
Vagden Mills Limited	Investigate the affect of low pH wastes on the receiving sewer.